OKI MICROLINE ML320/321

MAINTENANCE MANAUL

PREFACE

This maintenance manual describes field maintenance of the MICROLINE 320/321 printer and options for maintenance engineers,

For performance specifications and operating procedures, refer to the “User’s Manual”.

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1. CONFIGURATION

1. CONFIGURATION

1.1 Standard Printer Configuration

The standard configuration of the MICROLINE 320/321 is as follows.

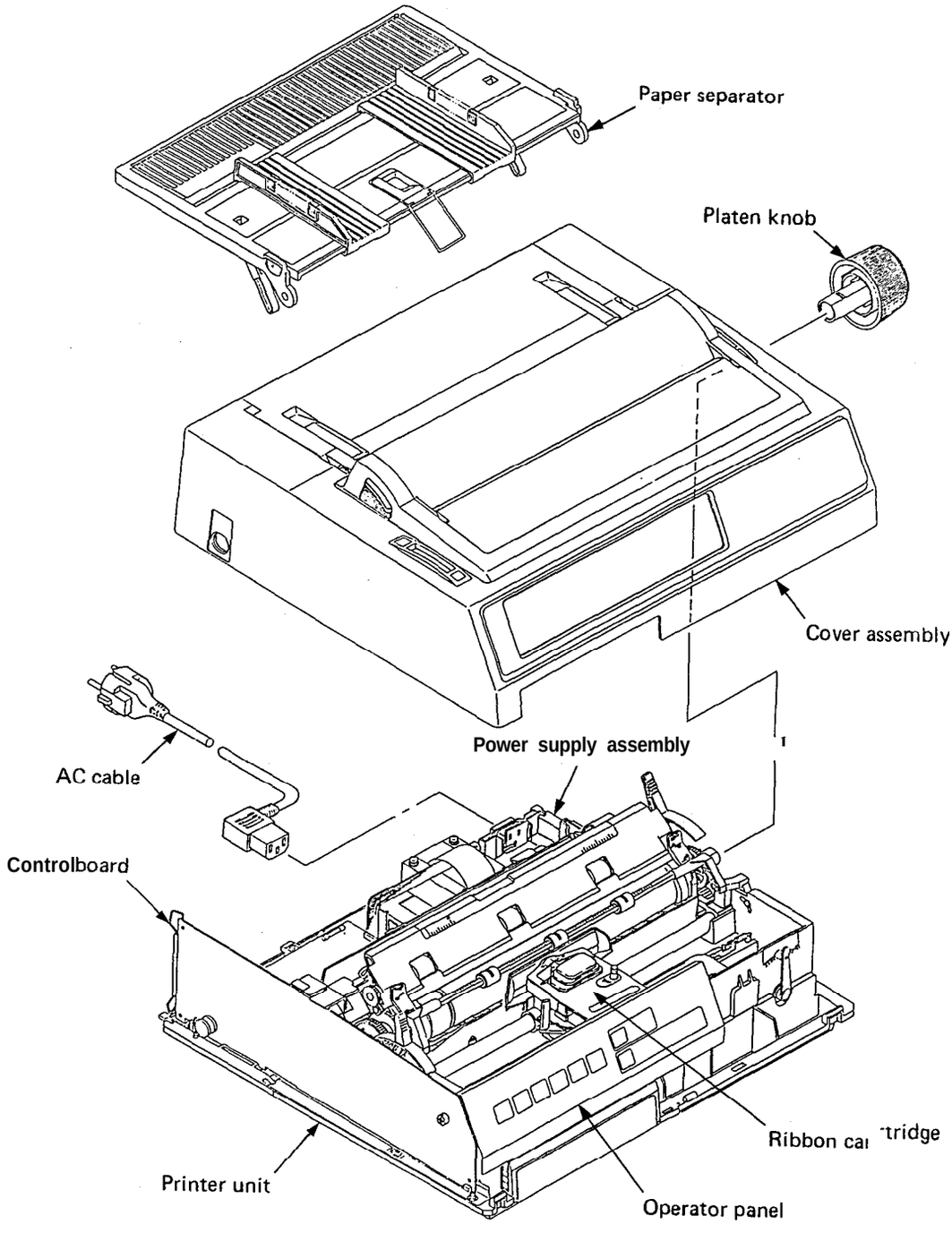
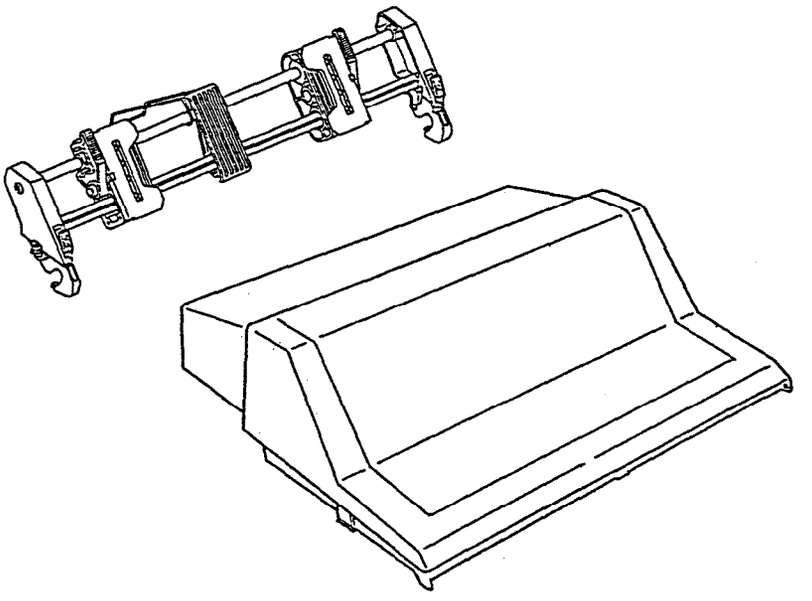


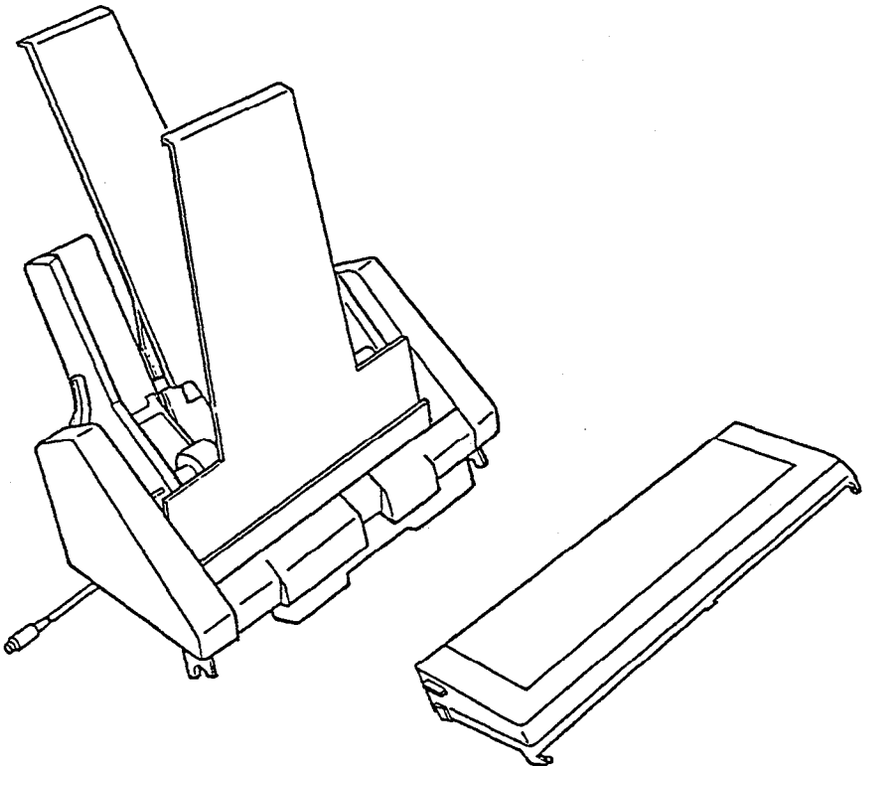
Figure I-I Printer configuration

1.2 Options

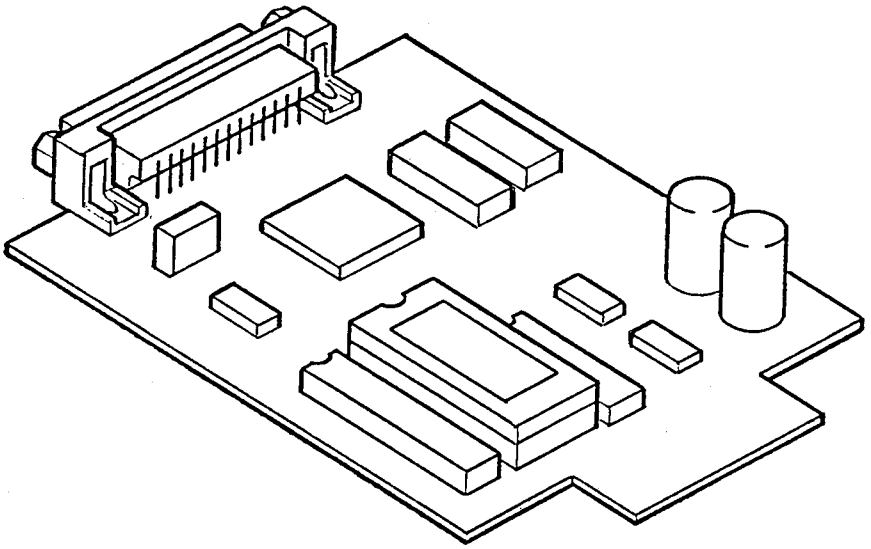
(1) Pull tractor feed unit with acoustic cover



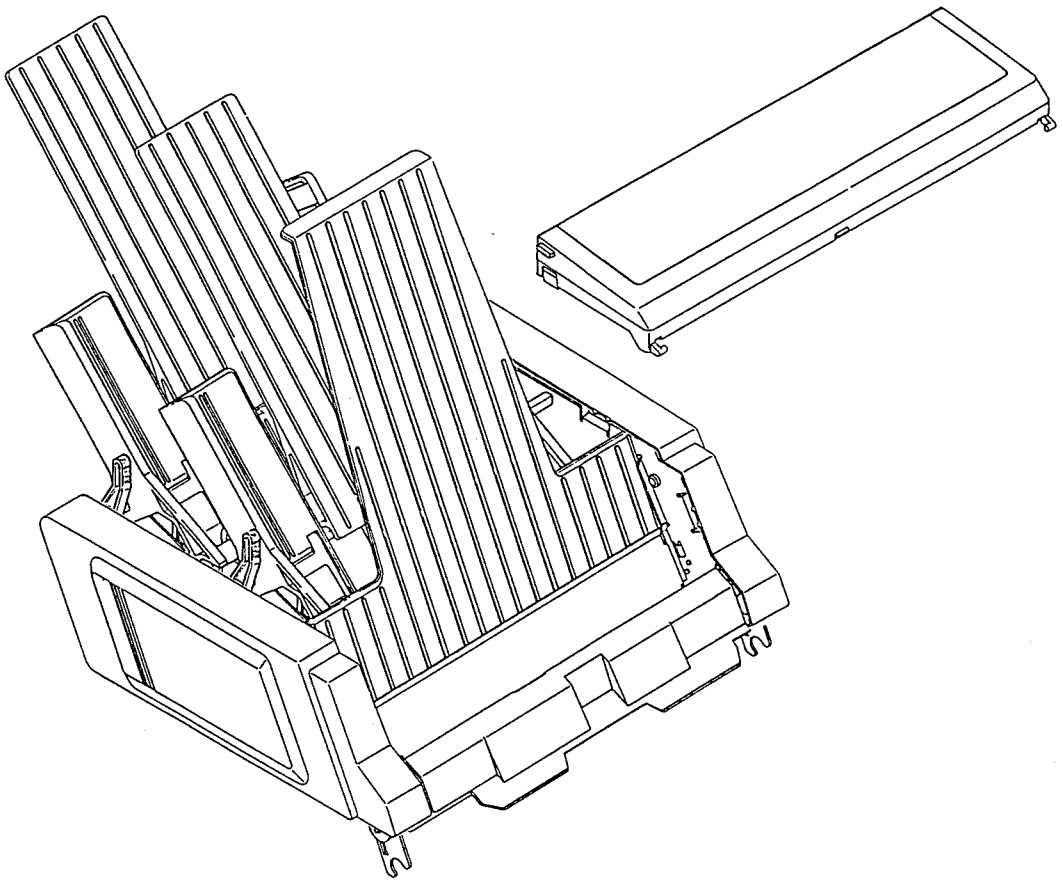
(2) Cut-Sheet Feeder unit with access cover



(3) Super-speed RS-232C serial interface board



(4) Dual cut-sheet feeder unit with access cover



1.3 Specifications

1.3.1 Print specifications

(1) **Print method** : Impact dot matrix

(2) **Number of dot wires:** 9

(3) **Dot wire diameter** : 0.013 inch (0.34 mm)

(4) **Print direction** : Bi-directional, short-line-seeking printing
Uni-directional printing specifiable

(5) **Print speed** :

Print mode	Character pitch			
	10 CPI	**12 CPI**	**17.1 CPI**	**20 CPI**
Utility	250 CPS	250 CPS	250 CPS	250 CPS
NLQ	62.5 CPS	62.5 CPS	62.5 CPS	62.5 CPS
HSD (*)	300 CPS	300 CPS	300 CPS	300 CPS

(*) High Speed Draft

(6) **Character sets**

Standard ASCII
IBM ALL Character Sets (IBM mode)
IBM Character Set I & II (IBM mode)
Italic Character Sets (EPSON mode)
Graphics Character Sets (EPSON mode)
International Character Sets (15 languages)

(7) **Character pitches**

The following character pitches are selectable *through the operator panel or with control codes:

5 CPI 0.2 inch (5.08 mm)
6 CPI 0.167 inch (4.23 mm)
8.5 CPI 0.117 inch (2.96 mm)
* 10 CPI 0.1 inch (2.54 mm)
* 12 CPI 0.083 inch (2.12 mm)
* 17.1 CPI 0.058 inch (1.48 mm)
* 20 CPI 0.05 inch (1.27 mm)

1.3.2 Paper specifications

(1) Cut-sheet paper

The standard size : 8-1/2 inches (wide) x 11 inches (long) for the U.S.
A4 size : 210 mm (wide) x 297 mm (long) for Europe
Weight : 12 to 24 lbs (45 to 90 g/m^2)
Multiple-part paper cannot be used.

(2) Sprocket paper

The tractor feed unit can handle sprocket paper of the following.

ML320: 3 to 10 inches (76.2 to 254 mm)
ML321: 3 to 16 inches (76.2 to 406.4 mm)
One-part paper
Ream weight: 12 to 24 lbs (45 to 90 g/m^2)
Multiple-part paper: 0.014 inch (0.356 mm) or less total thickness

		Ream weight	Number of sheets
Carbon-lined paper		9 to 11 lbs (35 to 40 g/m^2)	Up to 5 including original
Pressure-sensitive paper			
Interleaf paper	(paper)	10 to 12 lbs (38 to 45 g/m^2)	Up to 5 including original
	(carbon)	9 lbs (35 g/m^2)	

Multiple-part paper should be fastened by spot-pasting or crimping on both sides, and should be free of wrinkles.

(3) Cut envelope

Weight : 24 lbs (90 g/m^2) or less
Thickness : 0.016 inch (0.41 mm or less)
Size : Width 165~241.3
Length 92~127

(4) Multiple-part envelope

Weight : 24 lbs (90 g/m^2) or less
Thickness : 0.014 inch (0.36 mm or less)
Width : 3 to 10 inches (76.2 to 254 mm)
Medium feed : Bottom paper feed only

(5) Card

Weight : 100 lbs (162.8 g/m^2) or less
Thickness : 0.008 inch (0.20 mm) or less
Size : 5 × 8 inches (when cut apart)
Medium feed : Bottom paper feed only

(6) Label

Thickness : 0.011 inch (0.28 mm) or less
Size : ML320 – 8.27 × 3.25 inches (210 × 83 mm) or less
ML321 – 15 × 3.25 inches (381 × 83 mm) or less
Medium feed : Bottom paper feed only

(7) OHP sheet (transparencies)

Thickness : 0.004 inch (0.10 mm) or less
Size : 8.27 × 11.7 inches (210 × 297 mm) or less

1.3.3 Physical specifications

(1) Outside dimensions

ML320 : 15.67 inches (398 mm) (W) × 4.57 inches (116 mm) (H) × 13.58 inches (345 mm) (D)
ML321 : 21.73 inches (552 mm) (W) × 4.57 inches (116 mm) (H) × 13.58 inches (345 mm) (D)
These dimensions do not include the platen knob, acoustic cover and paper separator.

(2) Weight

ML320 : 17.6 lbs (8 kg)
ML321 : 22 lbs (10 kg)

1.3.4 Power requirements

(1) Input power

Single-phase AC
Voltage : One of the following as specified:
1. 120 VAC + 5.5% – 15%
2. 220/240 VAC ± 10%

Frequency : 50/60 Hz ± 2%

(2) Power consumption

Operating : About 80 VA
Idle : About 25 VA

1.3.5 Environmental conditions

(1) Ambient temperature and relative humidity

	Operating	Non-operating	Storage	Unit
Temperature	41 to 104 (5 to 40)	14 to 109.4 (– 10 to 43)	– 40 to 158 (– 40 to 70)	°F (°C)
Relative Humidity	20 to 90	5 to 95	5 to 95	% RH

The printer must be packed during storage.
Avoid condensation at all times.

(2) Vibration

Operating : 0.3G (5 to 150 Hz) or less (except when the unit is at resonant frequency)
Non-operating : 1G (5 to 150 Hz) or less (except when the unit is at resonant frequency)

(3) Impact (Drop)

Packing : 30" (One corner and three edge and all six sides)

1.3.6 Noise (UTL)

57 dB (A) or less (in all modes), 52 dB (A) or less (in quiet mode)

1.3.7 Agency approvals

UL No. : The printer is listed in UL STANDARD No. 478.
CSA No. : CSA certification to CSA STANDARD C22.2 No. 220
FCC : FCC certified per Part 15, SUBJECT J, CLASS B
VDE : VDE 0806, VDE 0875 Class B
BS : BS 5850

2. INSTALLATION PROCEDURE

2. INSTALLATION PROCEDURE

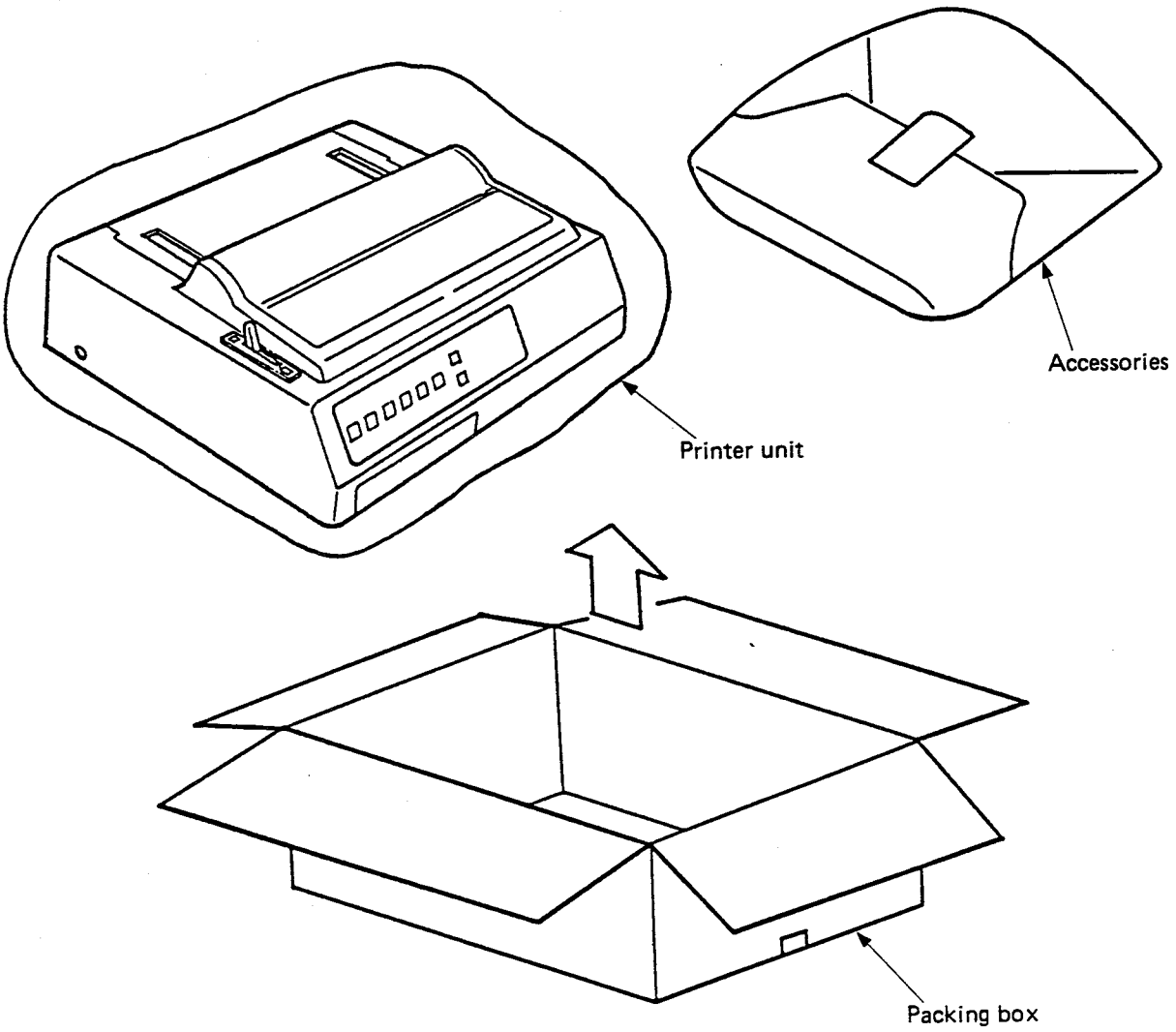
2.1 Unpacking

2.1.1 Unpacking the packing box

(1) Unpack the packing box.

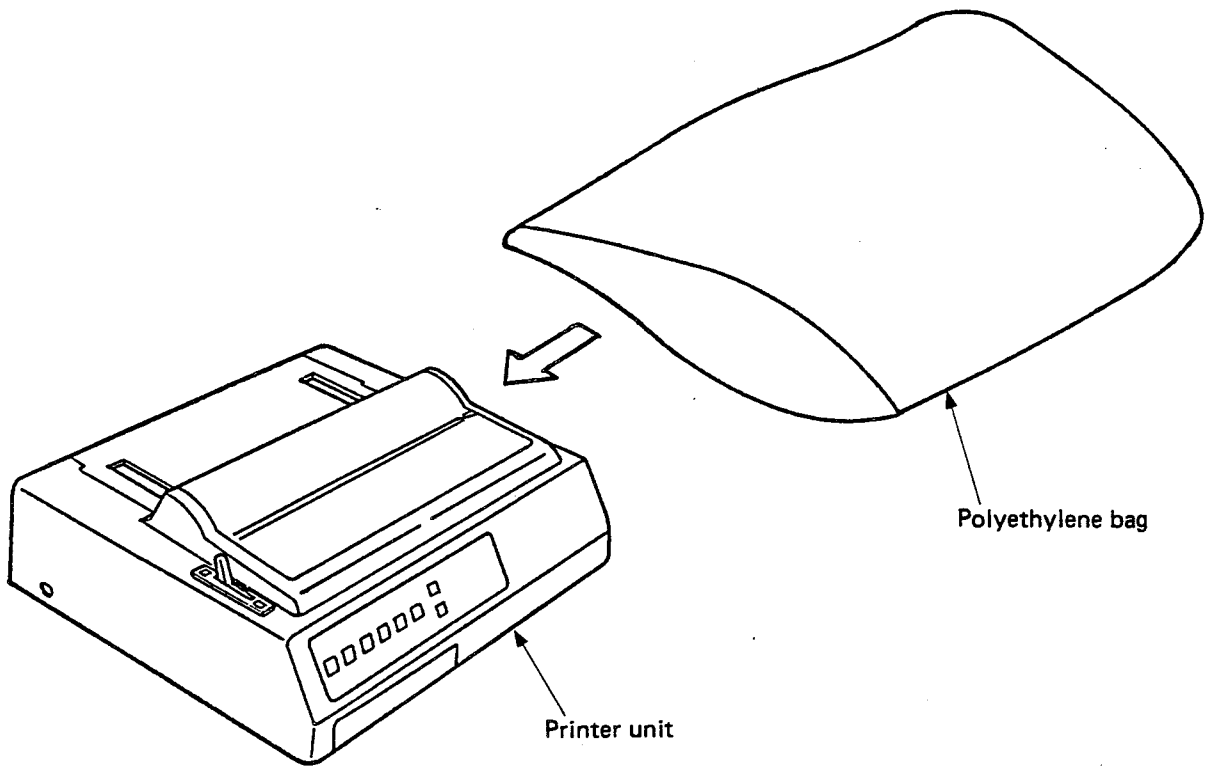
(2) Take out the printer unit.

(3) Take out the accessories.



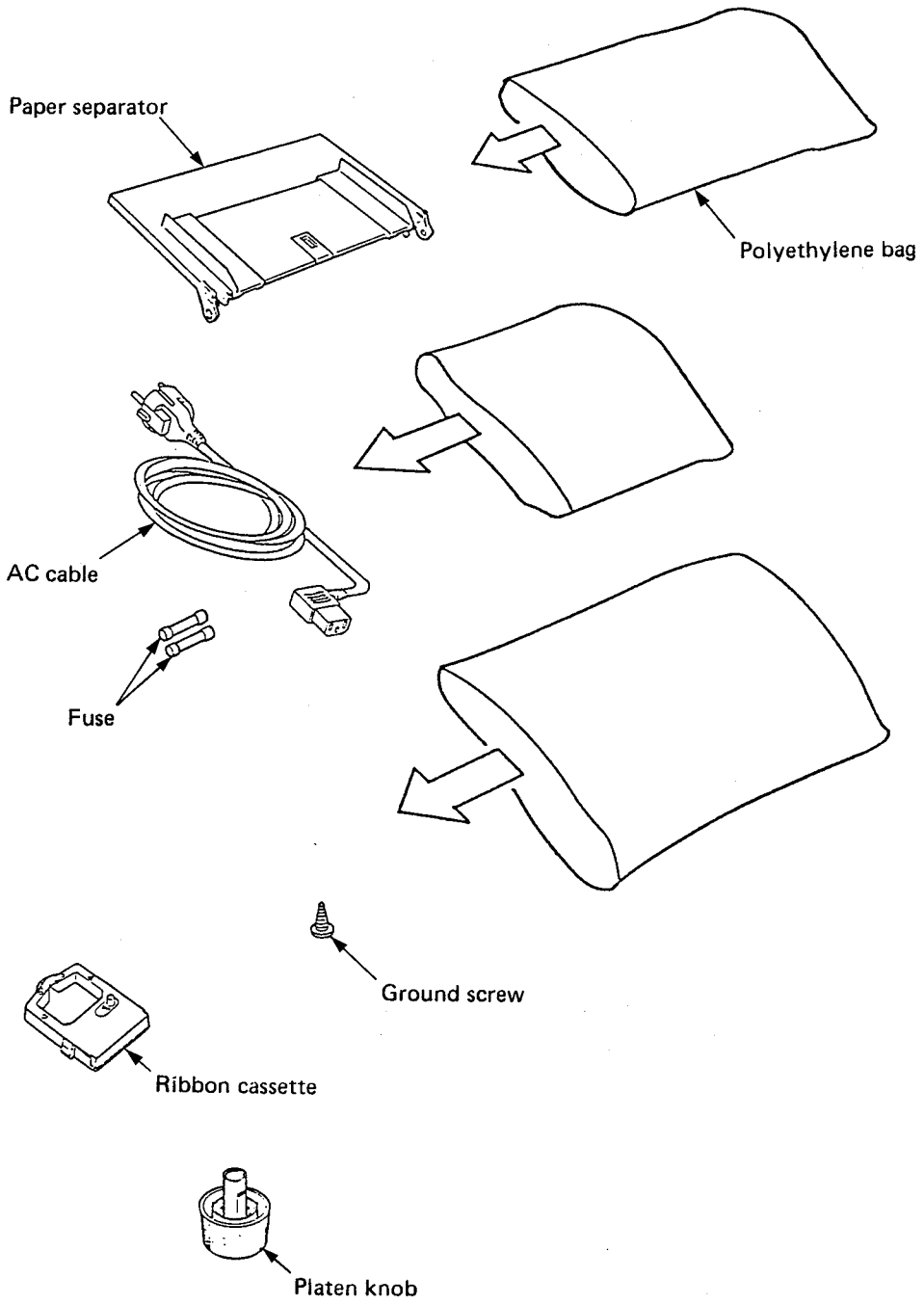
2.1.2 Unpacking the printer unit

(1) Remove the printer unit from the polyethylene bag.



2.1.3 Unpacking the accessories

(1) Remove the AC cable, paper separator, platen knob, fuses, ground screw, and ribbon cassette from their polyethylene bags.



2.2 Installation (Refer to the User's Manual for Details.)

2.2.1 Precaution for installation

Pay attention to the following when installing the printer:

(1) Do not install the printer in the following places:

(a) Any place exposed to direct sunlight.

(b) Any place with great fluctuations in temperature.

(c) Any place exposed to outdoor wind.

(d) A dusty place

(e) Near a door

(f) Near an air-conditioner.

(g) Any place with heavy vibration.

(2) Do not smoke in the area where the printer is installed.

(3) Adjust the temperature and humidity of the installation site as follows:

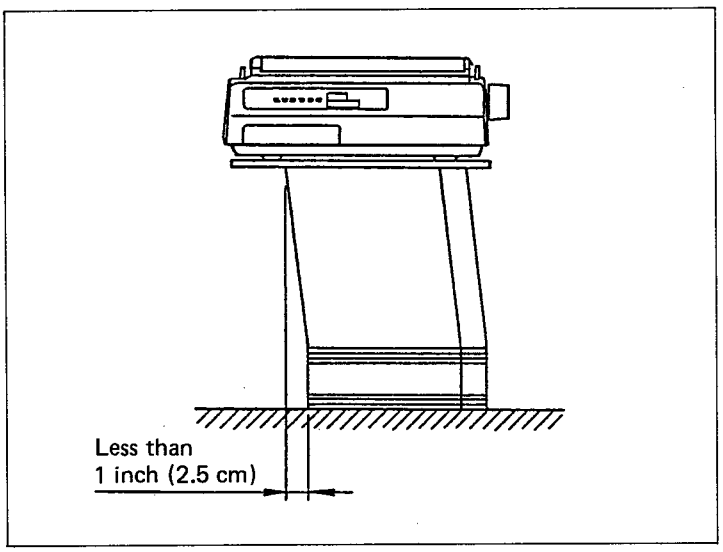
Temperature : 41 to 104°F (5 to 40°C)

Humidity : 20 to 90% RH

(4) Place the printer and continuous form by the following procedure:

1) The height of the desk for the printer is 28 inches (70 cm) standard.
(Install the printer on a level and flat desk or stand, so that the four rubber feet fit flatly on its surface.)

2) Paper positioning
Place forms in parallel with the paper feed path.
The tolerance of the left and right direction should be less than 1 inch (2.5 cm).



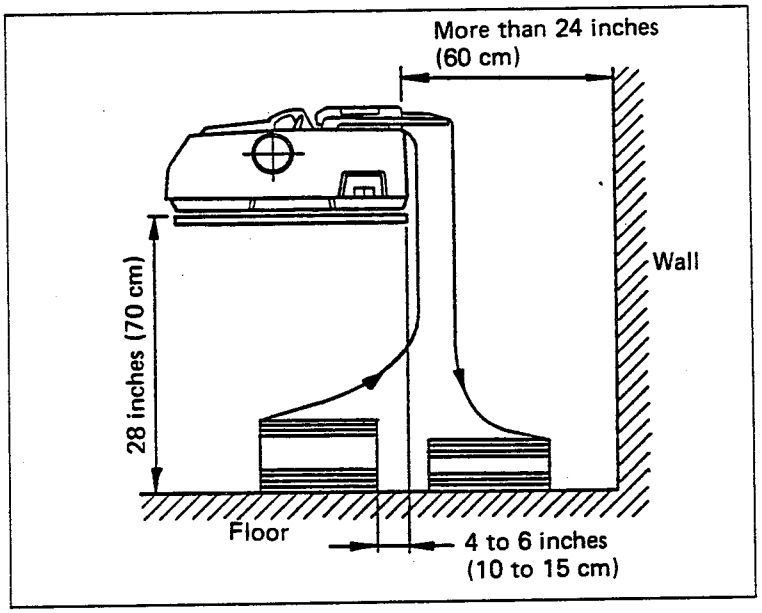
3) Printer space requirement

Align the rear part of the printer with the edge of the desk.

Leave a space of more than 24 inches (60 cm) at the rear of the printer for the form space.

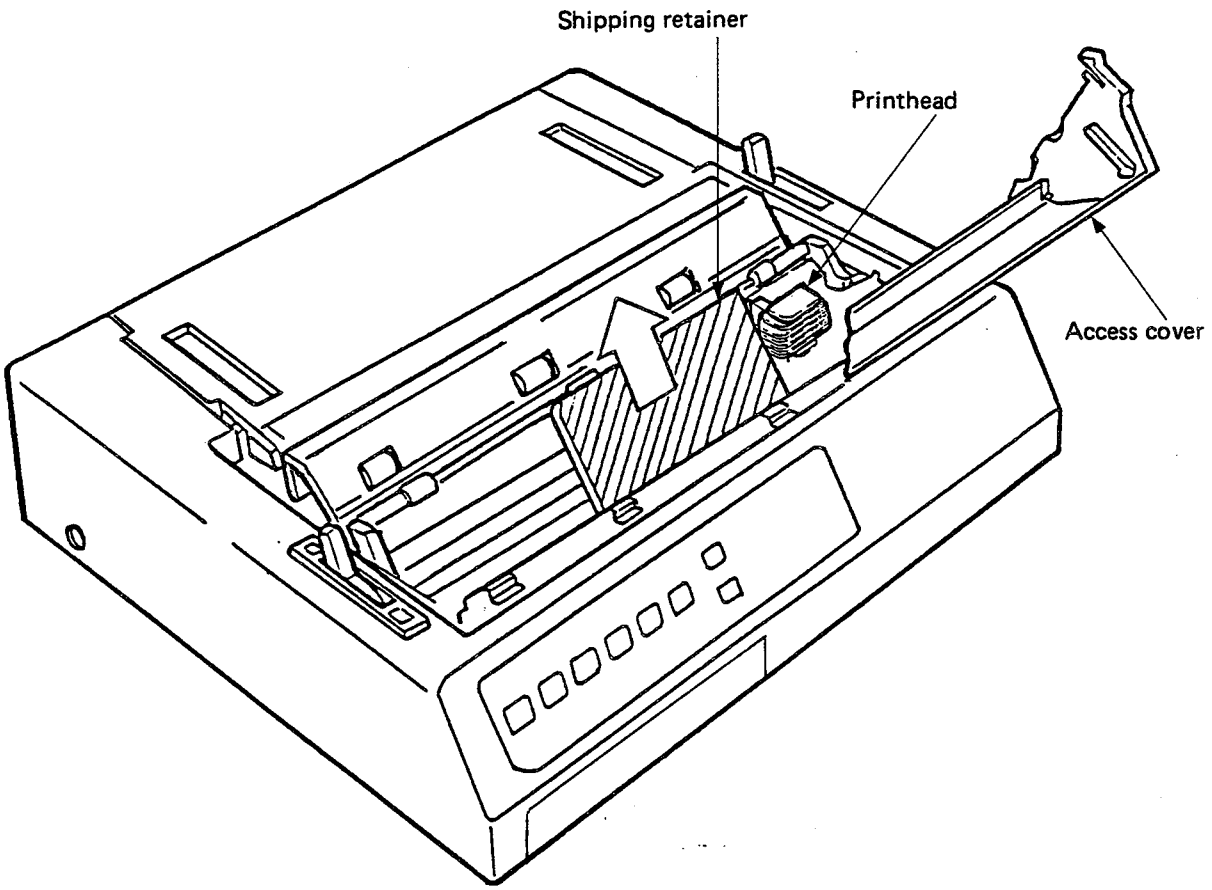
4) To prevent incoming and outgoing forms from interfering with each other, place the forms within 4 to 6 inches (10 to 15 cm) from the edge of the desk.

Paper jamming may occur if forms interfere with each other.



2.2.2 Removing the shipping retainer

Remove the shipping retainer which secures the printhead by opening the access cover.

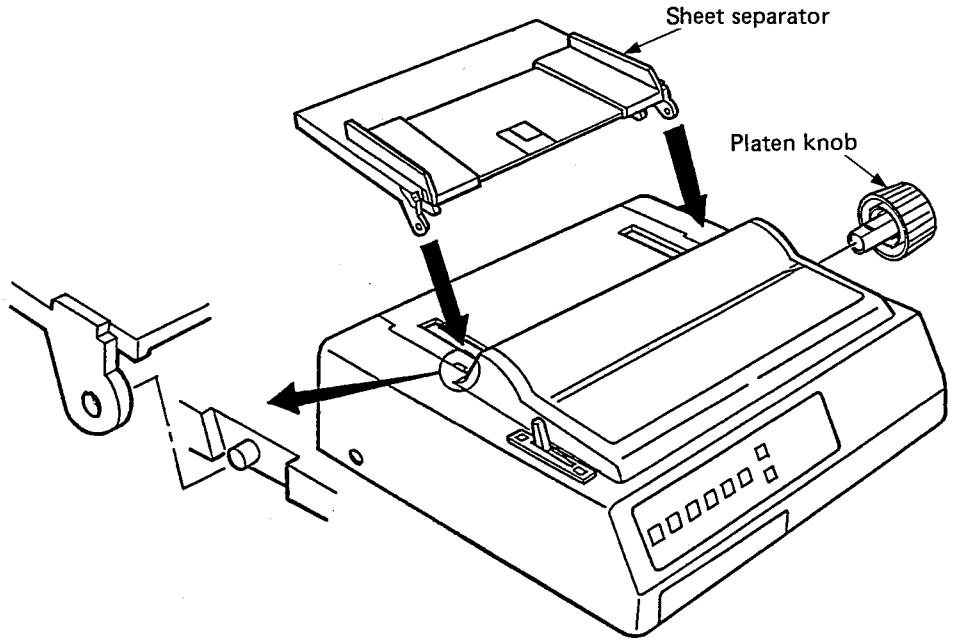


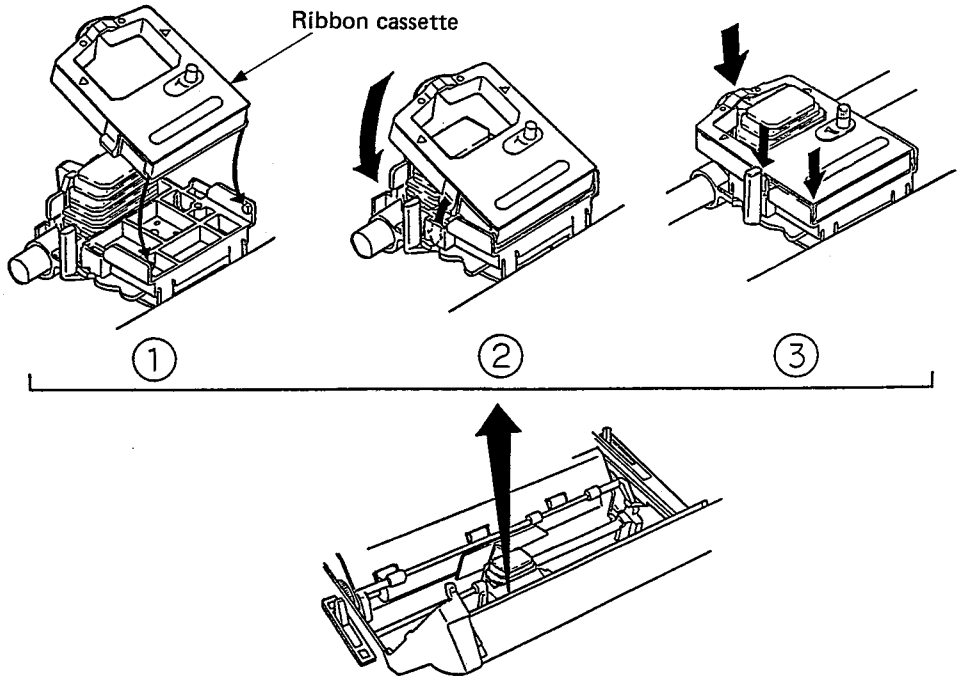
2.2.3 Installing the accessories

(1) Install the sheet separator.

(2) Install the platen knob.

(3) Install the ribbon cassette.



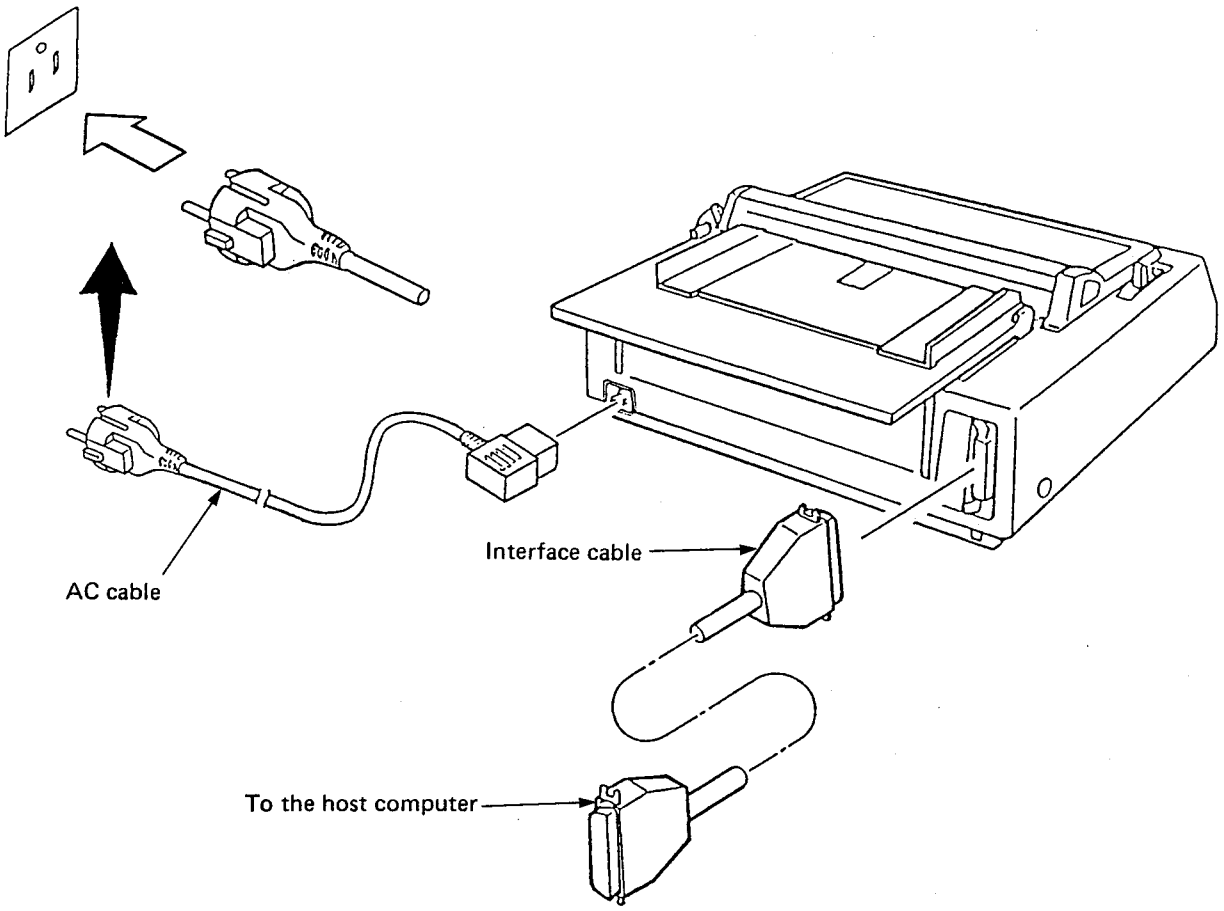


2.2.4 Connecting cables

(1) Connect the interface cable.

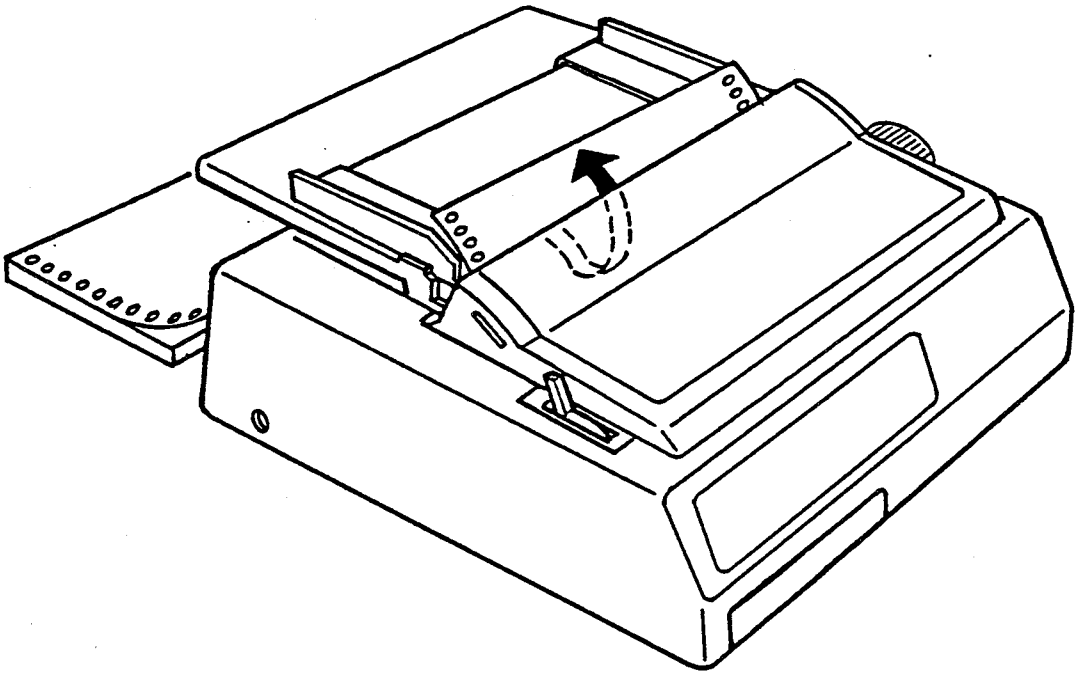
(2) Connect the AC cable.

Check that the AC power switch on the right side of the printer is set to OFF (0).



2.2.5 Installing Printer paper

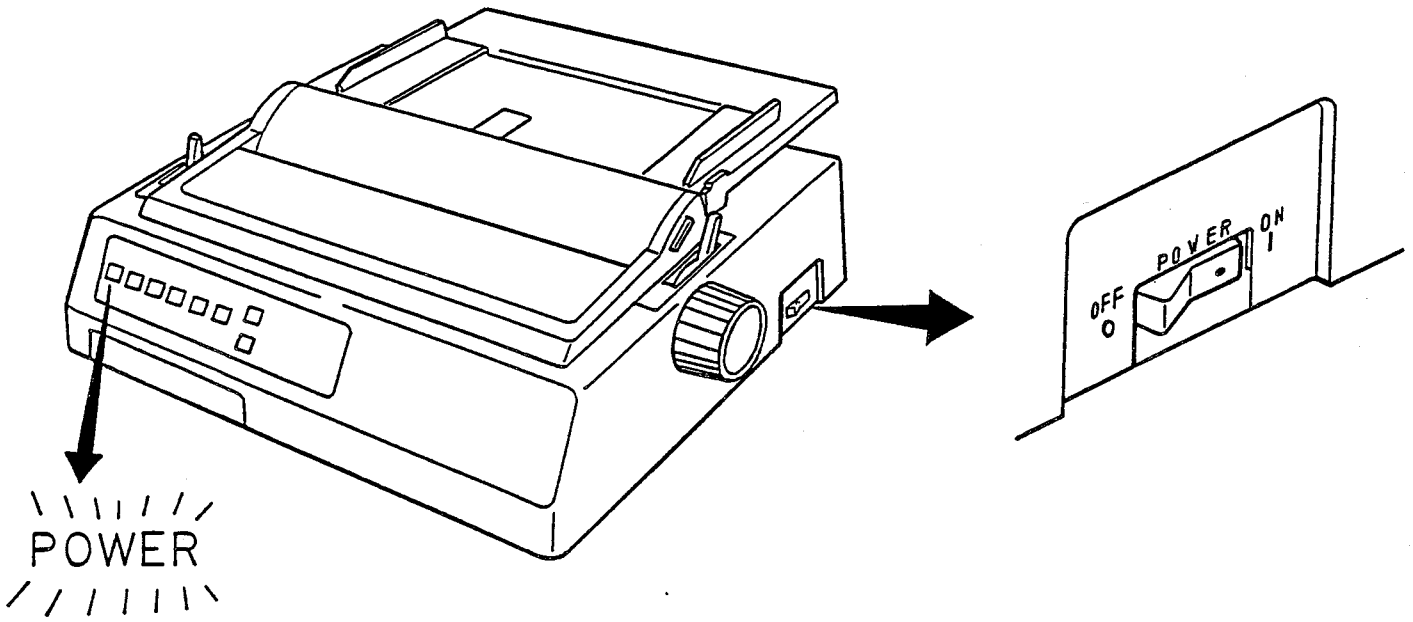
Set continuous paper to test the unit, and do print out the menu options. (Refer to User's manual for details).



2.2.6 Turning on the printer

(1) Press the AC "POWER" switch on the right side of the printer to "ON".

(2) Confirm that the "POWER" lamp lights and the printhead returns to its home position.



2.2.7 Rolling ASCII test pattern

(1) Confirm that the "POWER" switch is OFF; then, while pressing the "TOF/QUIET" switch, press the "POWER" switch to "ON".

(2) The rolling ASCII pattern as shown below will be printed.

(3) To finish the test, press the "MODE" switch.

(4) When the "SEL" lamp lights, the printer unit is ready to receive printing data from the host computer.

```
 !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmno
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnop
"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopq
#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqr
$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrs
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456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~ !"#$
56789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~ !"#$%
```

3. OPERATION

3. OPERATION

3.1 Electrical Operation

This section describes the operation of the printer circuits.

3.1.1 General

The block diagram of the printer circuit is shown in Figure 3-1.
On the control board are mounted not only the microprocessor and its peripheral circuits but also the drive circuits, paper end sensor and interface connector.

The power supply is connected to the control board via the DC power supply board. Other electrical parts are connected via the connection board.

3.1.2 Microprocessor and peripheral circuits

(1) Microprocessor (Q7: 80C154)

The microprocessor is the nucleus of the control circuit. Its peripheral circuits operate under control of this microprocessor. The I/O ports of the microprocessor are connected with the address bus, data bus, and control lines.

(2) Program ROM (Q13)

The program ROM stores the control program for the printer, and stores the character fonts. The microprocessor operates under the control of this program.

(3) RAM (Q8, Q9 and Q12)

The RAM stores data such as received print data, and stores all character fonts. Q12 has battery backup even after power is off.

(4) LSI (MSM6990) (Q11)

The MSM6990 is an external interface and motor control LSI. It has the following functions:

A: External interface controller

(a) Parallel interface function

The parallel interface function mode is selected when the level of the mode selection signal (ISEL) is high. In this mode, IFD1 to 8 are used as an input port; they are used as an output port when the serial interface board is connected; the parallel data received through the interface connectors is latched in synchronization with the strobe signal ($\overline{STB}$) and is sent to the CPU in synchronization with the RD signal. In this mode, the MSM6990 also sends $\overline{BUSY}$, ACK, $\overline{PE}$ and $\overline{SELECT}$ signals to the interface connector in synchronization with the $\overline{WR}$ signal.

(b) Serial interface function (not used)

The ISEL signal goes low and the serial interface function mode is selected. In this mode, the MSM6990 sends $\overline{SSD}$, $\overline{RTS}$, and $\overline{DTR}$ signals to the interface connector in synchronization with the $\overline{WR}$ signal.

B: Motor controller

(c) Spacing speed control function

This function accelerates and decelerates the spacing motor in accordance with commands from the microprocessor and controls the spacing motor speed in each printing mode.

(d) Dot timing generation function

This function generates the dot-on timing signal ($\overline{IPT}$), synchronized with the printing speed in accordance with output signals (PHASE A, B) of the encoder on the spacing motor, and sends this timing information to the microprocessor.

C: D-RAM controller

(e) Executes refresh and read/write of D-RAM (Q8, Q9) by RAS, CAS 1 to 3, DRAM A0 to A7 signals.

D: Other functions

(f) I/O ports

The MSM6990 has a 12-bit output port and a 10-bit input port. It outputs control signals in accordance with the commands input from the microprocessor.
The input port is also used to read information on the printer's condiiton.

(g) Address latch

The address latch latches the low-order 8 bits of the address bus (A0 to A7). These bits are used as an address for read/write operations with peripheral devices.

(h) Address-decoder

The address decoder decodes the address signal, and sends out the RAM (Q12) chip select signal ($\overline{SRAMSEL}$).

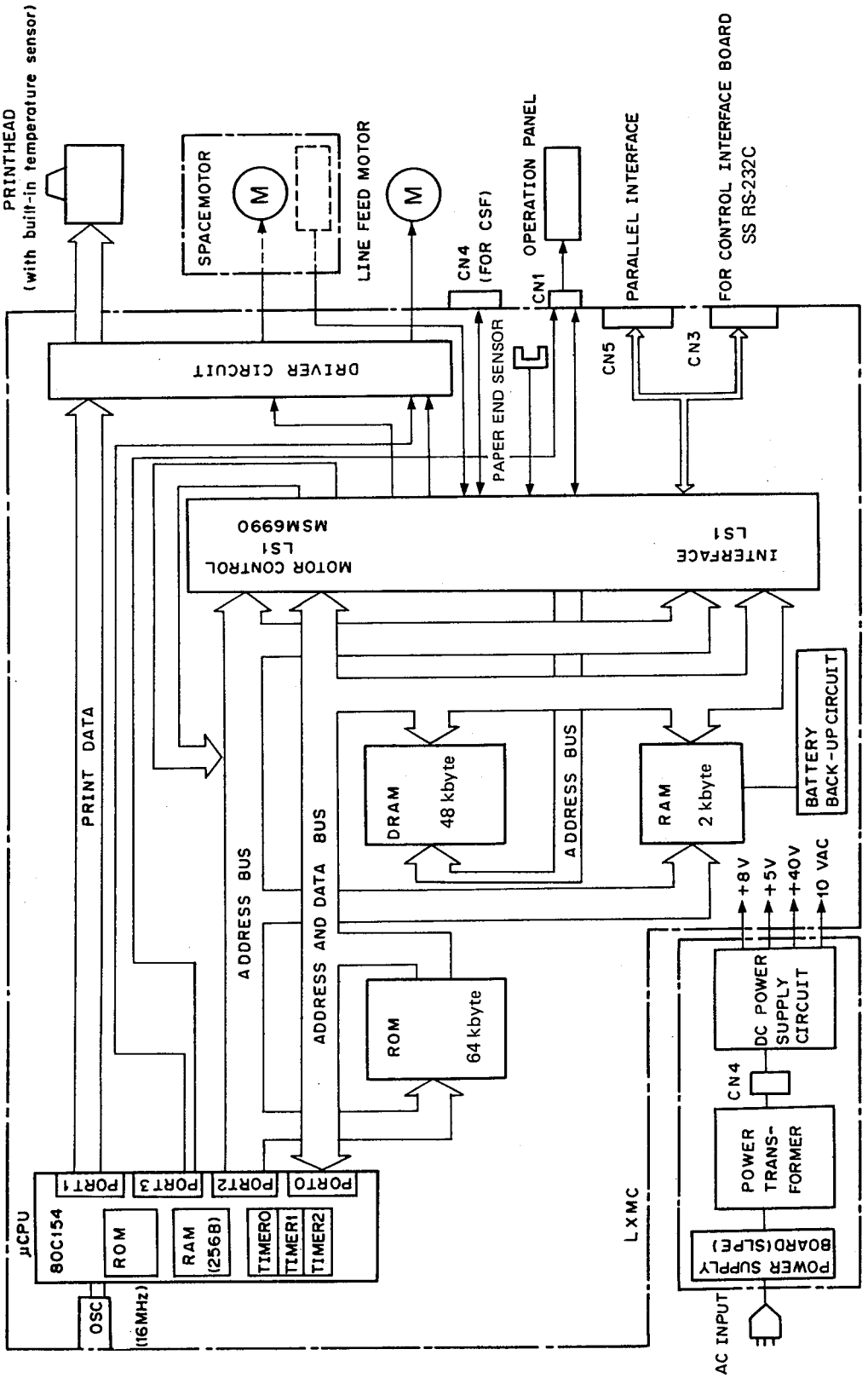


Figure 3-1 Block diagram

3.1.3 Initialization

The printer is initialized when the power is turned on or when the parallel interface signal, I-PRIME, is received from the host computer.

Initialization is started when the RST OUT signal is sent from the reset circuit (Q6 pin 14) to Q11 and Q7, and SRST OUT is sent to each devices.

When the reset is completed, the program starts with mode setting of Q11, and Q6, a memory (ROM and RAM) check , RAM initialization, and then carriage homing. The program finally establishes the interface signals (output of ACK signal, BUSY signal, etc.), lights the SELECT indicator, and informs the host computer that the printer is ready to receive data (in the data reception wait state), thus completing the initialization.

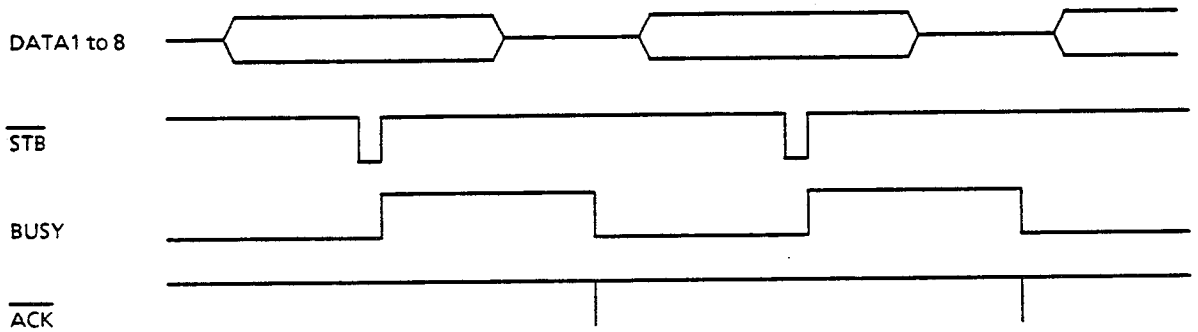
3.1.4 Interface control

(1) Parallel interface

The data from the interface is input through connector (CN5), and the interface LSI (Q11: MSM6990) latches this input data in sync with the $\overline{STB}$ signal.

The BUSY signal is on during processing of this data. When the processing is completed, the BUSY signal is turned off, and an $\overline{ACK}$ signal is sent to request more data.

The BUSY signal is also sent to stop data sending when data cannot be received because the receiving buffer is full, etc.

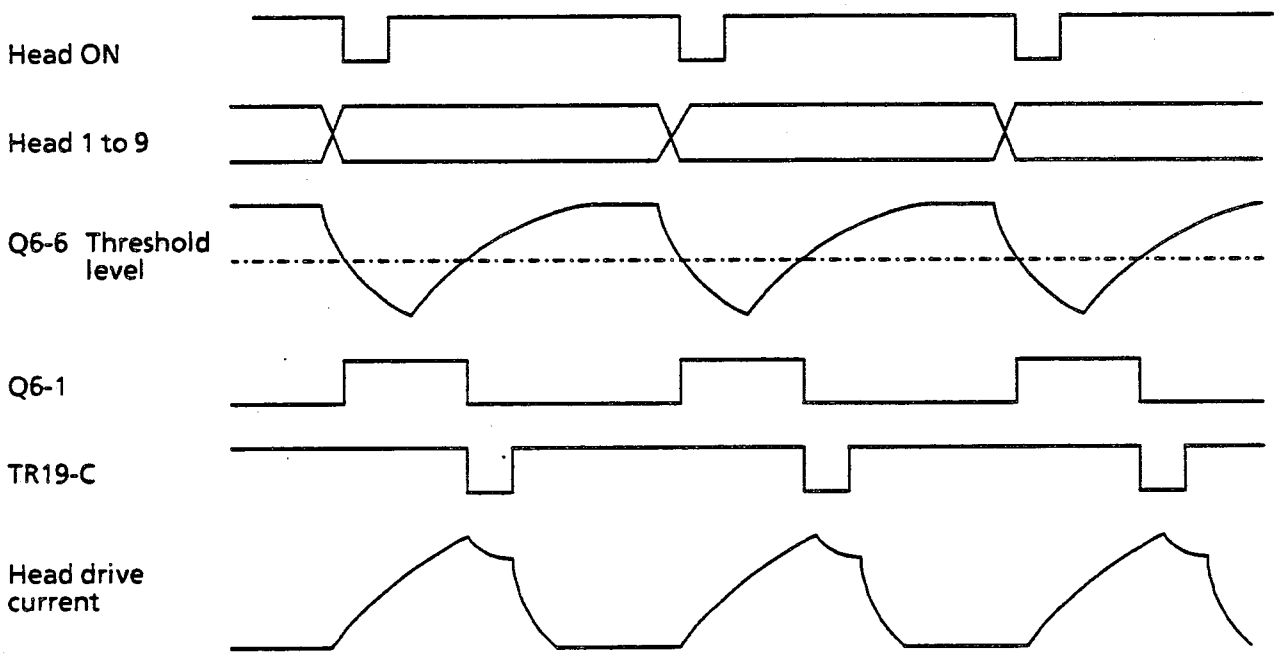


3.1.5 Printhead drive circuit

This circuit drives the head magnets corresponding to the HEAD DATA1 to 9 signals in accordance with the HEAD-ON signal, to make the printhead print characters.

When the HEAD-ON signal goes low, the RC integrator determines the head drive time. This integrator automatically compensates the printing pressure in accordance with the drive voltage (+40V).

That is, the integrator elongates the drive time if the drive voltage lowers, and shortens the drive time if the drive voltage rises.



3.1.6 Spacing operation

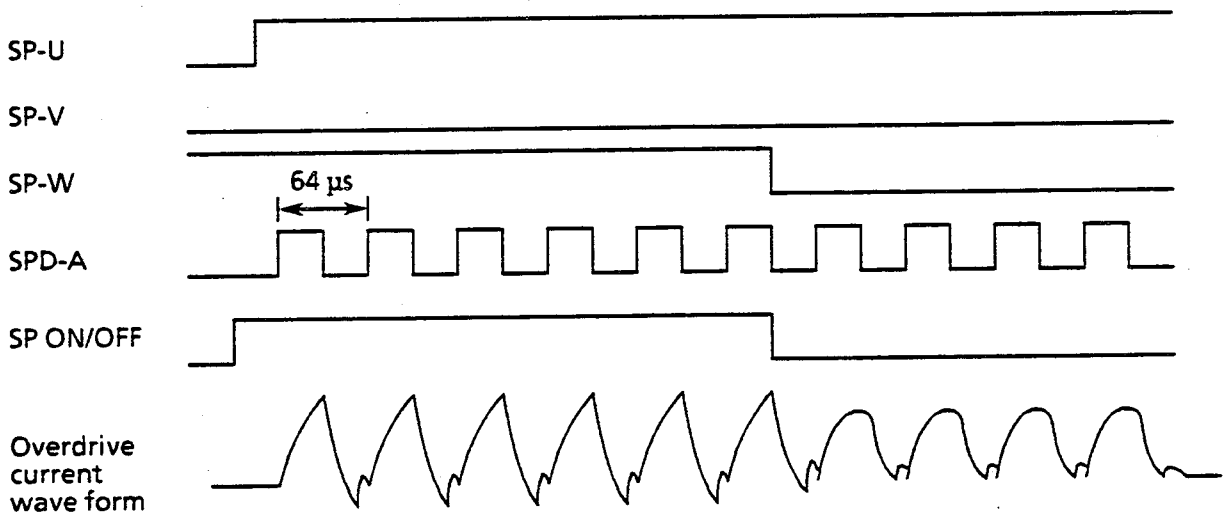
(1) Spacing motor control

The motor control LSI (Q11: MSM6990) outputs the spacing motor phase signals (SP-U, SP-V, and SP-W) in accordance with the spacing command from the microprocessor, and at the same time outputs the overdrive signal (SPD-A).

The SPD-A signal is a fixed-period pulse signal whose pulse width is controllable by the program, and is used to control the motor drive time.

The SP ON/OFF signal is used when acceleration and deceleration require a larger torque.

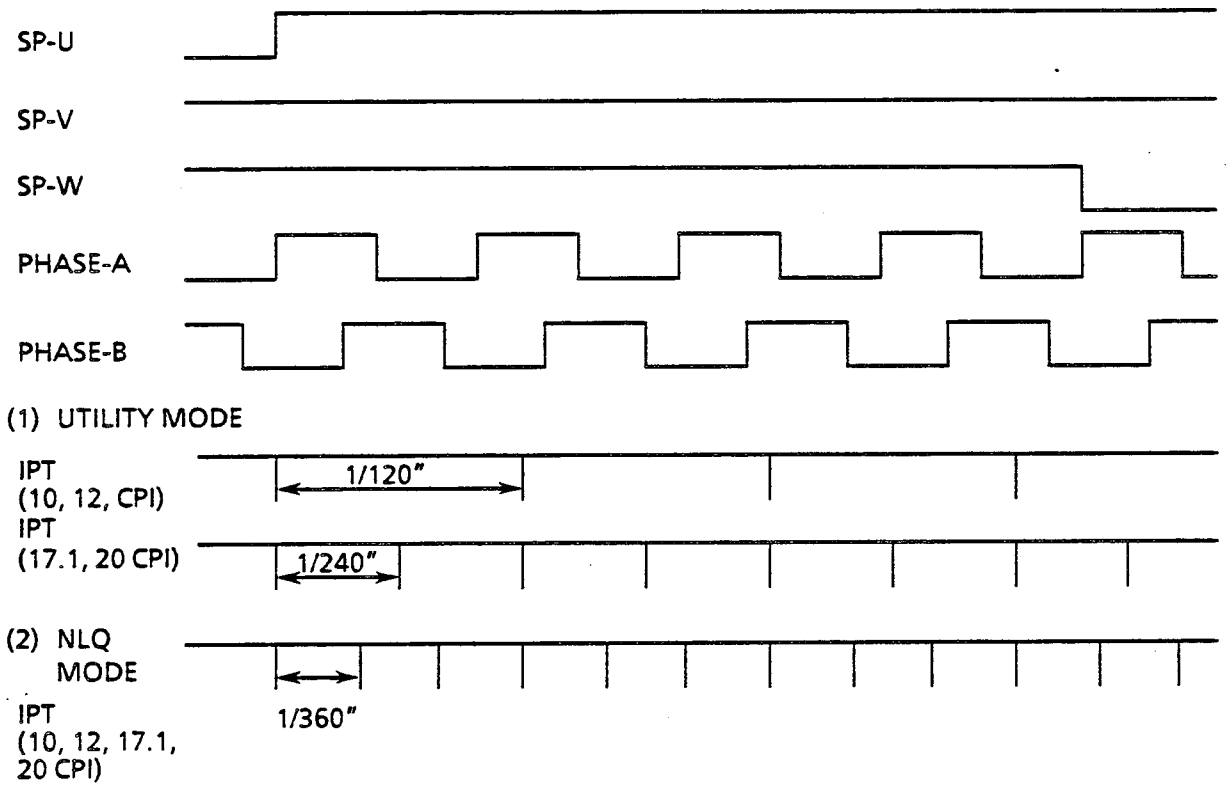
The motor driver (MTDV) drives the spacing motor in accordance with these signals. Pins 9 and 11 of the MTDV are for the protective circuits against overvoltage and overcurrent, respectively.



(2) Encoder disk

In the operation of the spacing motor, the PHASE-A and PHASE-B signals are generated when the encoded disk interrupts the photosensor.

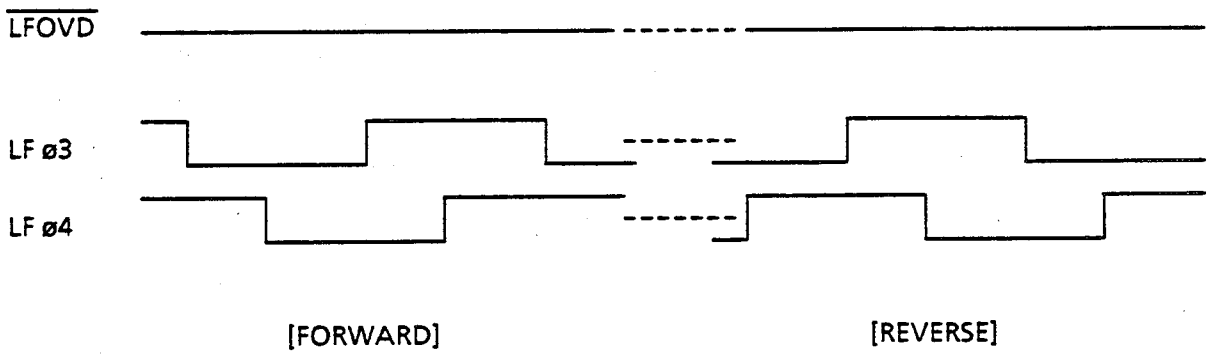
The motor control LSI (Q11: MSM6990) frequency divides these edge pulse signals in accordance with the print pitch, and sends the $\overline{IPT}$ signal to provide dot-on timing and carriage position detection timing.



3.1.7 Line feed operation

The line feed motor is held stationary with the LF HOLD signal (minute holding current: approx. 25 mA) while it is at a stop.

During line feed operation, the line feed motor is driven by a large current supplied in accordance with the LF OVD signal.



3.1.8 Alarm circuits

(1) Drive circuit fault alarm

This is a protective circuit which causes the AC fuse to open when a fault occurs in the printhead drive circuit, space motor drive circuit, or their peripheral circuits, thus preventing component failure.

For this purpose, this circuit monitors the drive time using the HDALM and SPALM signals interlocked with the overdrive signal of each drive circuit. If the drive time of any drive circuit exceeds the specified time, the drive circuit fault alarm circuit sends an ALM signal (high) to turn on the SCR.

This causes the secondary coil (+40 V) of the transformer to be short-circuited, causing an overcurrent to flow through the primary coil to open the AC fuse.

(2) Printhead overheat alarm circuit

In order to protect the head coils, this circuit monitors the head temperature using the built-in printhead thermistor.

If heavy-duty printing is performed continuously for a long time, the printhead temperature rises. When the head temperature reaches a certain value (about 100°C), a head overheat alarm is detected.

When the alarm is detected, the printing operation is halted to wait for the head temperature to fall. When the head temperature returns below the alarm detection temperature, the printing operation is restarted.

The alarm detection is performed as follows:
When the temperature in the printhead rises, the resistance of the thermistor falls and the potential of the comparator (Q6) negative input falls to invert the comparator output, thus causing the HEAD TEMP signal to be sent to the motor control LSI.

3.1.9 Paper end detection circuit

When the paper runs out or is not installed, the photosensor (PE) on the control board is turned off as a result the $\overline{\text{PAPER END}}$ signal becomes low. This signal is fed to pin 55 of the motor control LSI (Q11), causing the printing operation to be stopped and the ALARM indicator to light.

3.1.10 Power supply

The power supply consists of a power transformer, a filter board, and a DC power supply board. The input AC voltage is transformed into 8.6 VAC, 46 VAC, and 10 VAC by the power transformer. These AC voltages are rectified into +8 VDC, +5 VDC, and +40 VDC levels by the DC power supply board and supplied to the control board.

(1) Filter board

The filter board includes the power switch, AC fuse and AC noise filter.

(2) Power transformer

If the power transformer temperature rises abnormally then the built-in temperature fuse of the transformer open to prevent any damage to other components.

(3) Power supply board

Transforms the AC voltage input to DC voltage (+8 VDC, +5 VDC and +40 VDC) and supplies it to the control board.

3.2 Mechanical Operation

3.2.1 Printhead mechanism and operation (See Figure 3-2.)

The printhead is a spring charged 9-pin driving head using a permanent magnet. It is attached to the carriage, which moves in parallel with the platen. Electrically, this unit is connected to the control circuits through the main pc board.

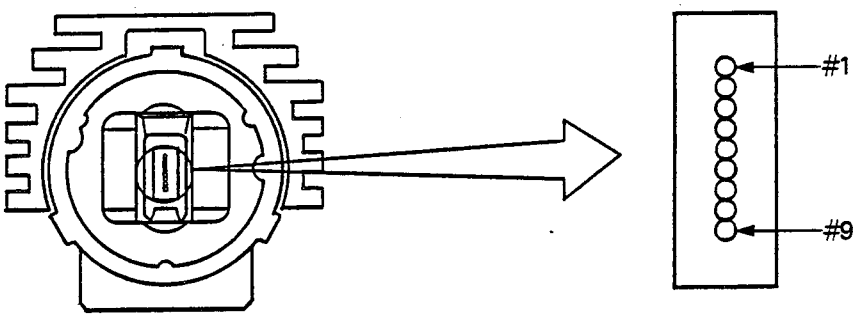


Figure 3-2 Arrangement of the head pins
View from the tip of the printhead

(1) The printhead configuration:

The printhead is composed of the following parts:

(a) Wire guide
(b) Print wires
(c) Armature assembly
(d) Yoke
(e) Spring
(f) Spacer
(g) Magnet assembly
(h) Thermistor
(i) Printed circuit board

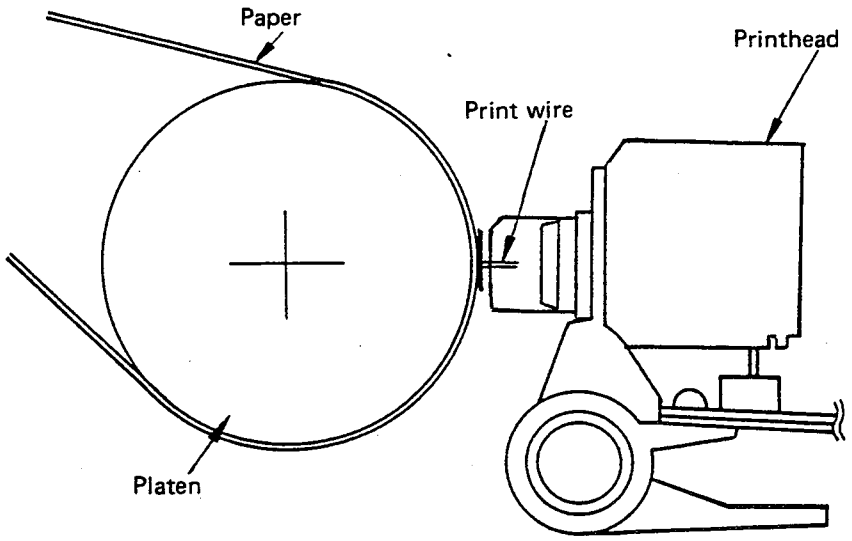
(2) Operation of printhead (See Figure 3-3.)

When the printhead is idle, the armature is attracted by a permanent magnet and the spring fixing the armature is compressed. The print wires fixed to each armature are thus concealed under the wire guide.

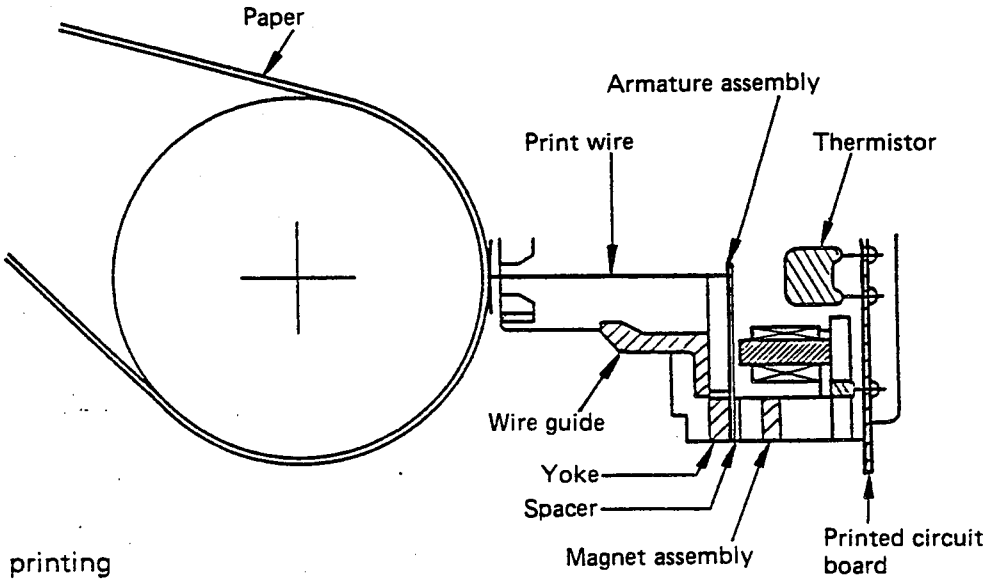
When a signal for a character to be printed is detected, a current flows through the coil. When the coil is activated, the magnetic flux (caused by the permanent magnet between the armature and the poles) is canceled to eliminate the attraction force. The armature is driven in the direction of the platen by the force of the armature spring. The print wire fixed to the armature protrudes from the tip of the wire guide, strikes the paper through the ribbon and prints a dot on the paper.

After the character has been printed, the armature is magnetically attracted again and the print wires are again concealed under the wire guide.

A thermistor in the printhead prevents burning caused by over-heating of the coil during extended continuous bi-directional printing. When the temperature of the coil exceeds a pre-determined limit (about 110°C) the control circuit detects a thermistor signal. Printing will then be intermittent or stop completely until the coil temperature falls below the limit value.



(1) When printing



(2) When not printing

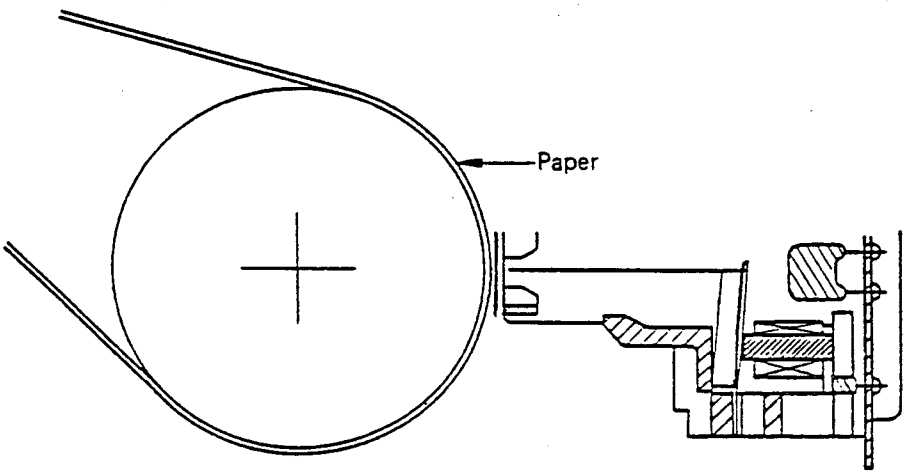


Figure 3-3

3.2.2 Spacing operation (See Figure 3-4.)

The spacing mechanism consists of a carriage shaft mounted in parallel with the platen, and a carriage frame that moves along the shaft. It is driven by a DC motor mounted on the bottom of the carriage frame. Items included in the spacing mechanism are as follows:

(a) DC motor with motor gear

(b) Carriage frame (stationary yoke and motor pc board included)

(c) Carriage shaft

(d) Space rack

(e) Sensor

(f) Encoder disk

(1) Spacing operation

The carriage frame, on which the printhead and space motor are mounted, moves along the carriage shaft in parallel with the platen. When the spacing motor rotates counterclockwise, the driving force is transmitted to the motor gear. As the motor gear rotates, the carriage moves from left to right.

Mechanically, it is designed in such a way that for every revolution of the DC motor, the carriage frame moves 0.8 inch (20.32 mm).

At the same time the encoder disk rotates together with the motor and passes the sensor. The position of the carriage frame can be determined by counting the interrupts detected by the sensor.

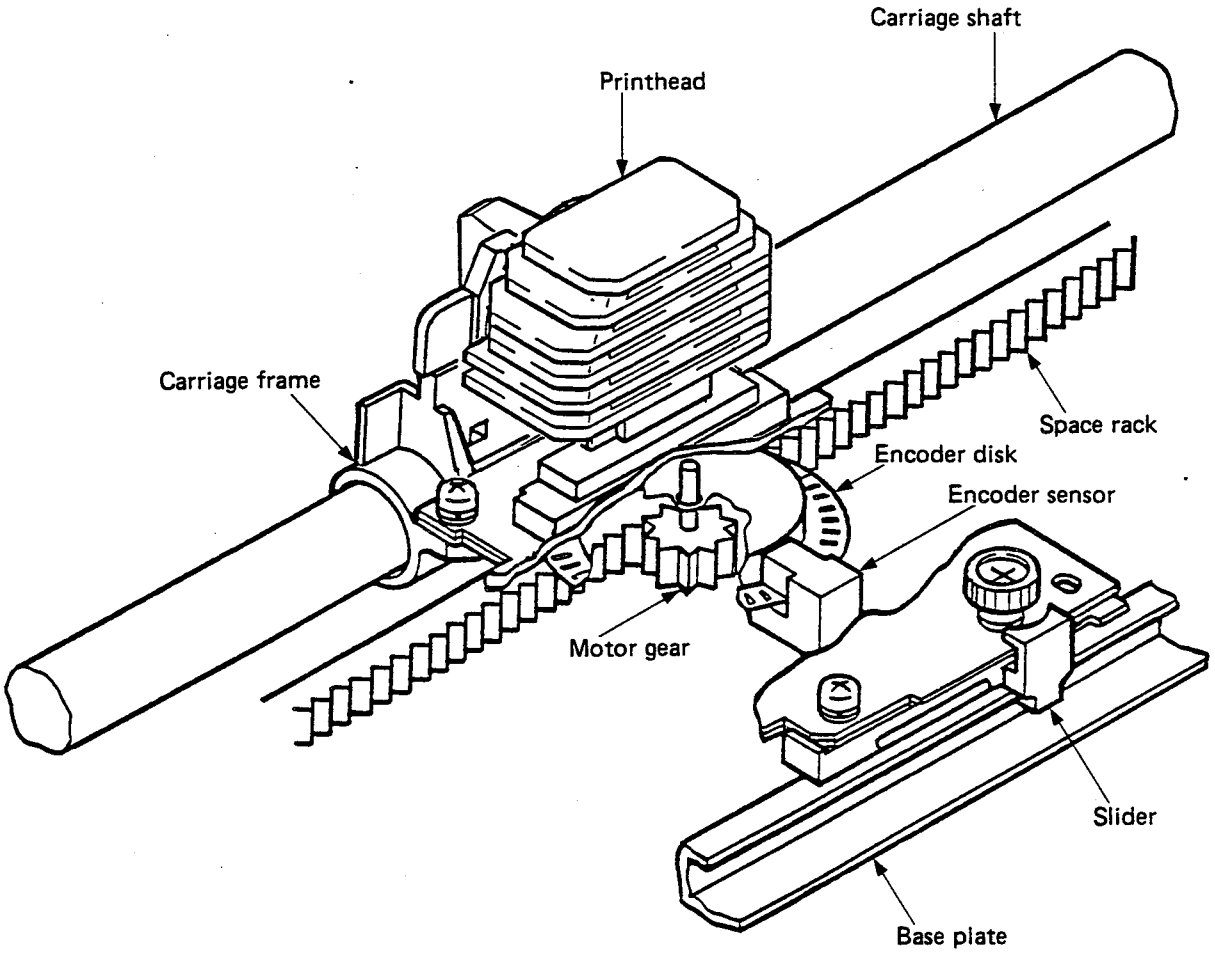

Carriage shaft
Printhead
Carriage frame
Space rack
Encoder disk
Encoder sensor
Motor gear
Slider
Base plate

Figure 3-4

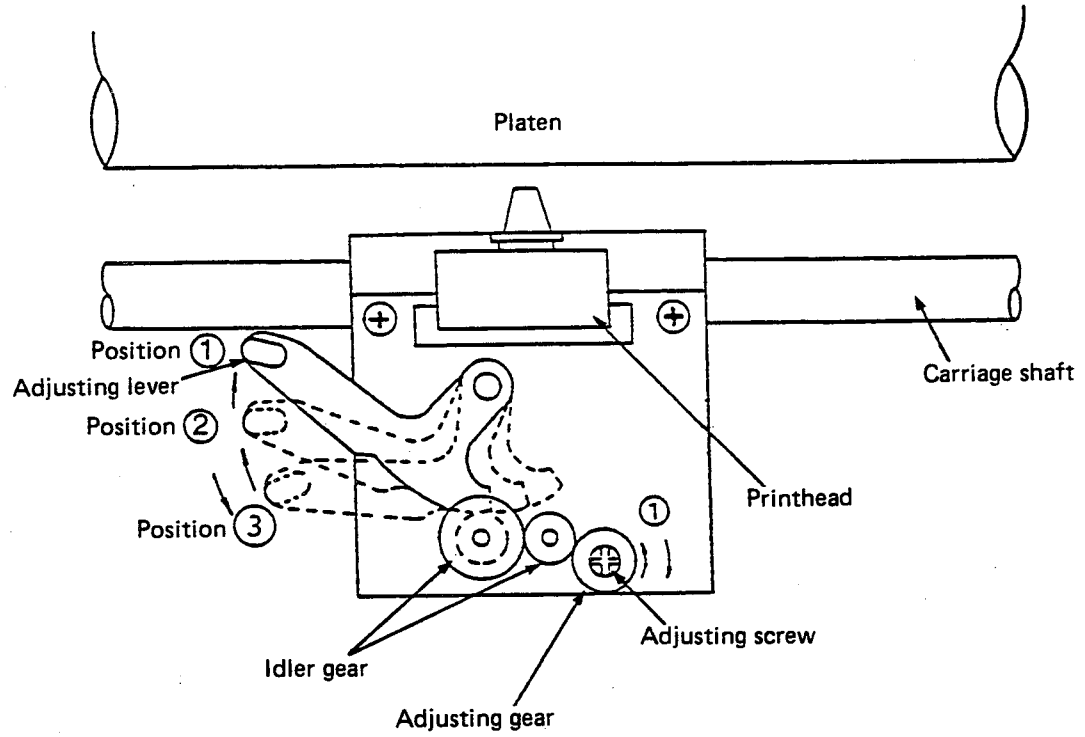
3.2.3 Head gap adjustment mechanism (See Figure 3-5.)

This mechanism moves an adjusting lever back and forth to tilt the carriage frame, creating an appropriate gap between the printhead and the platen.

An adjusting screw, which is connected to the adjusting gear, is rotated by moving the adjusting lever. Eventually the carriage changes its angle relative to the carriage axis.

The printhead, which is attached at the right angle to the opposite side of the adjusting screw on the carriage frame, will move away from or come closer to the platen as the tilt changes.

When the adjusting lever is set to position ③, the contact which is attached to the rear side of the carriage cover will come into contact with the spacing motor pc board. The printer will then reduce the printing speed automatically to ensure that the printing pressure is maintained for multipart paper.


Platen
Position ①
Adjusting lever
Position ②
Position ③
Carriage shaft
Printhead
①
Adjusting screw
Idler gear
Adjusting gear

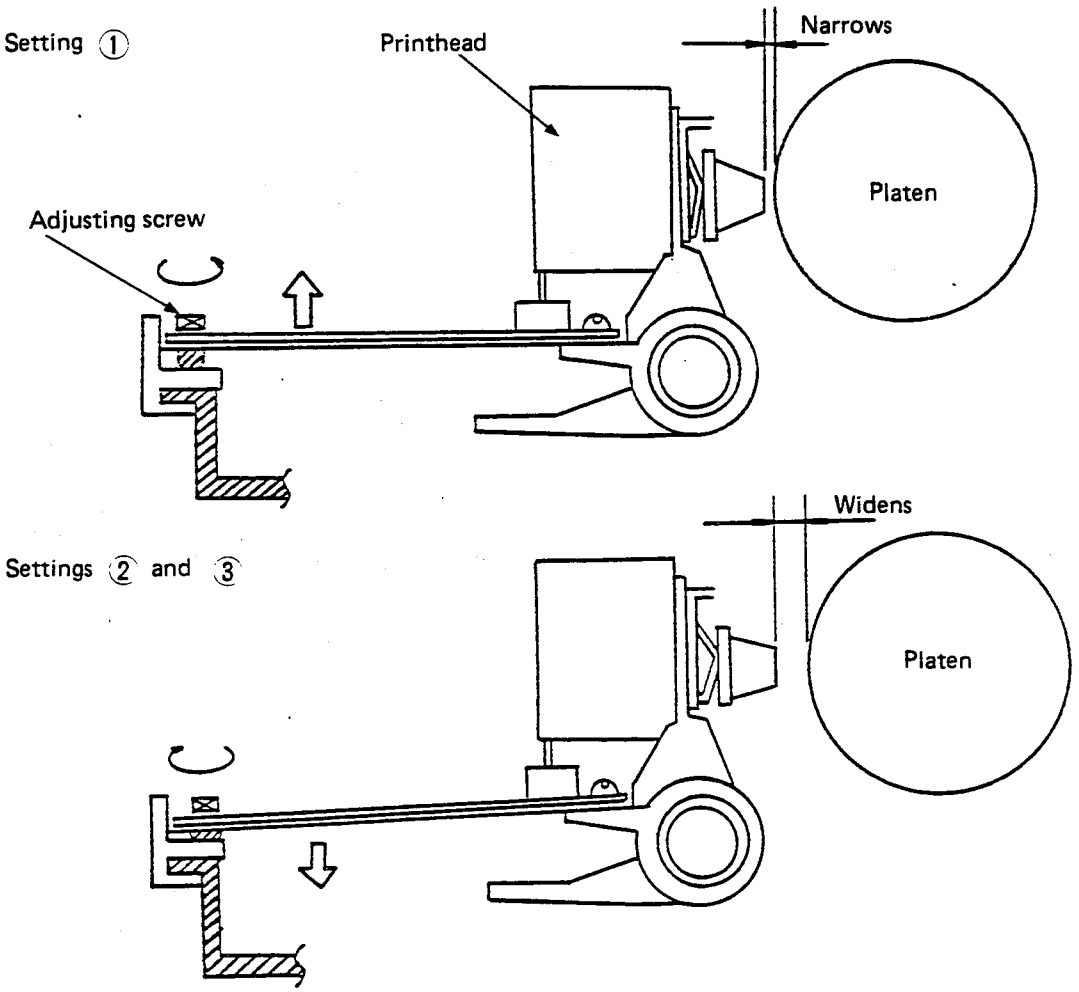

Setting ①
Printhead
Narrows
Platen
Adjusting screw
Settings ② and ③
Widens
Platen

Figure 3-5

3.2.4 Ribbon drive operation (See Figure 3-6.)

The ribbon drive mechanism feeds the ribbon in synchronization with the spacing operation, and the driving force is obtained from the spacing motor.

Items of the ribbon drive mechanism are as follows:

(a) Ribbon drive gear assembly

(b) Ribbon gear (space motor)

(c) Ribbon cartridge

(1) Ribbon cartridge

An endless ribbon with a one way feed is used. Ink is supplied from an ink tank, which is built into the ribbon cartridge.

(2) Drive operation

When the space motor is activated, the ribbon gear on the spacing motor shaft rotates. The rotation is transmitted via a combination of gear from the ribbon drive gear assembly to the drive gear in the ribbon cartridge, thus feeding the ribbon.

Although the ribbon moves in the reverse direction for bi-directional printing, the gears in the ribbon drive gear assembly maintain the same feed direction of the ribbon by switching the rotation a direction of the gears.

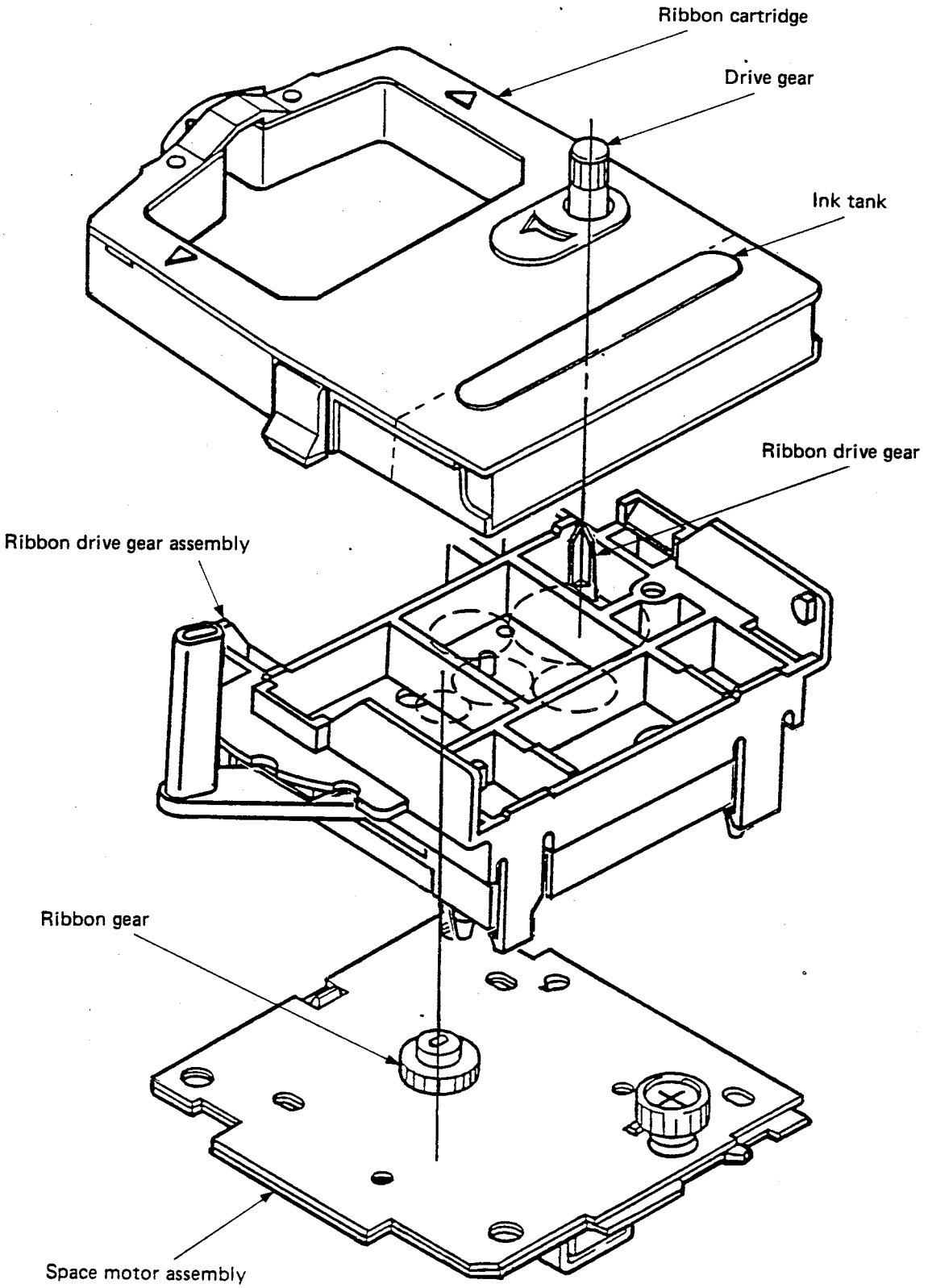

Ribbon cartridge
Drive gear
Ink tank
Ribbon drive gear
Ribbon drive gear assembly
Ribbon gear
Space motor assembly

Figure 3-6

3.2.5 Paper feed operation

Feeding of the paper is performed by turning the platen and the pin tractor, which is driven by the LF pulse motor.

Item of the paper feed mechanism are as follows:

(a) Pulse motor with gears

(b) Decelerating gear

(c) Platen

(d) Tractor feed unit

(e) Pressure roller

(1) Cut-sheet feed operation (See Figure 3-7.)

The pulse motor used for the paper feed mechanism is mounted on the left of the frame, and the rotation of the motor is transmitted through decelerating gears (idler gear, platen gear) to the platen. When using cut-sheet paper, the release lever must be in the closed position to grab the paper, while disengaging the push tractor.

Mechanically, it is designed in such a way that if the stepping motor rotates 48 steps (360°), the paper advances 0.17 inch (4.23 mm).

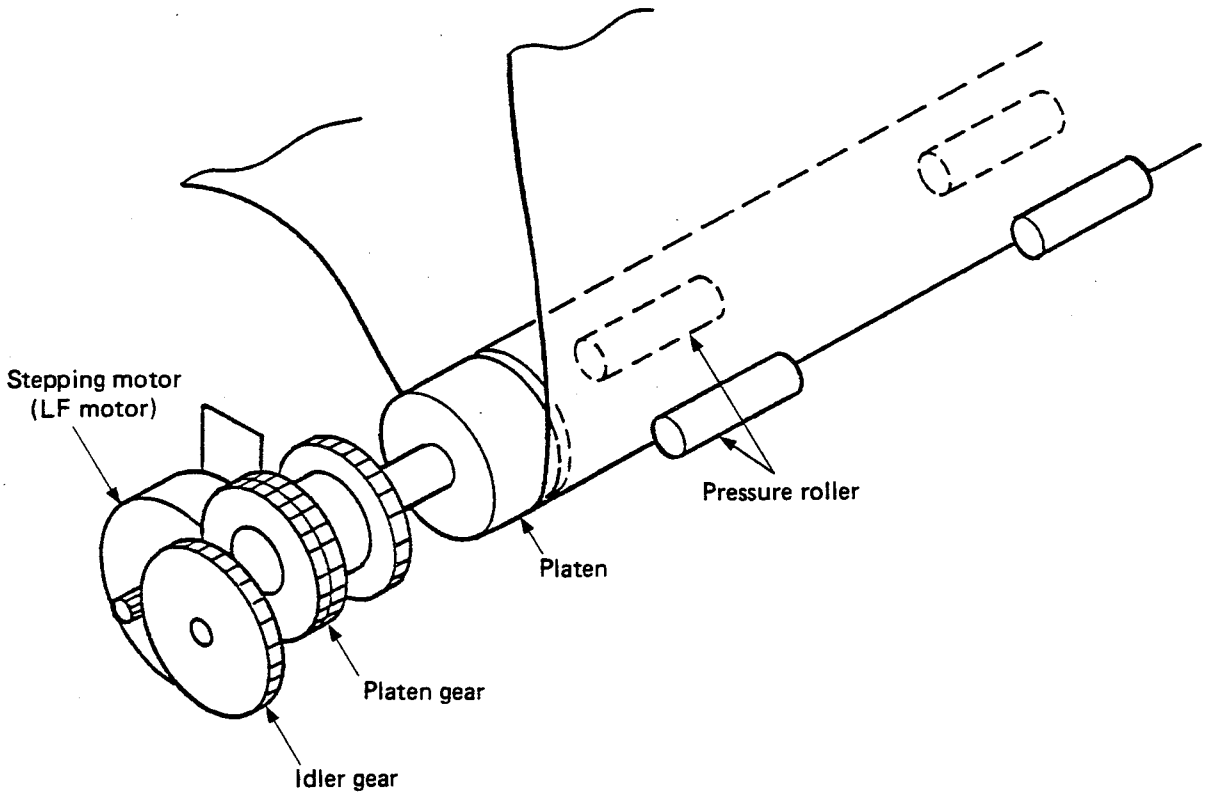

Stepping motor
(LF motor)
Pressure roller
Platen
Platen gear
Idler gear

Figure 3-7

(2) **Continuous paper feed operation (See Figure 3-8.)**

The force transmitted to the platen, rotates the tractor gear through platen gear, the idler gear and the change gear. The rotation of the tractor gear makes the pin tractor belt rotate through a sheet feeder shaft, feeding the continuous paper.

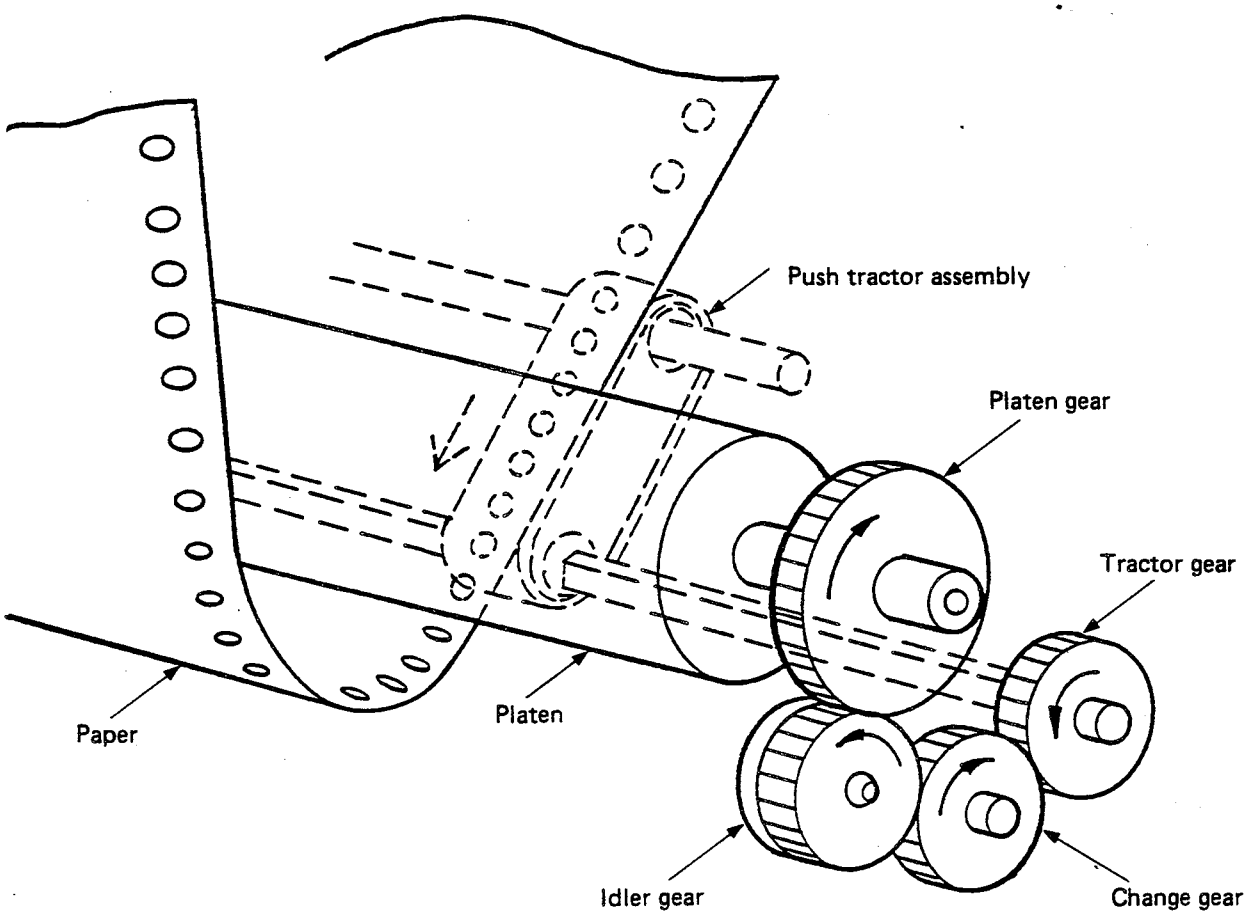


Figure 3-8 Paper feed operation of continuous paper

(3) Cut-sheet and continuous sheet switching mechanism (See Figure 3-9.)

Cut-sheet and continuous sheet are selected by the release lever on the right of the printer mechanism. When the release lever is pushed back, the change gear is moved outward as shown in the direction of the arrow. As the power transmission from the idler gear to tractor gear is removed, the pin tractor is kept still.

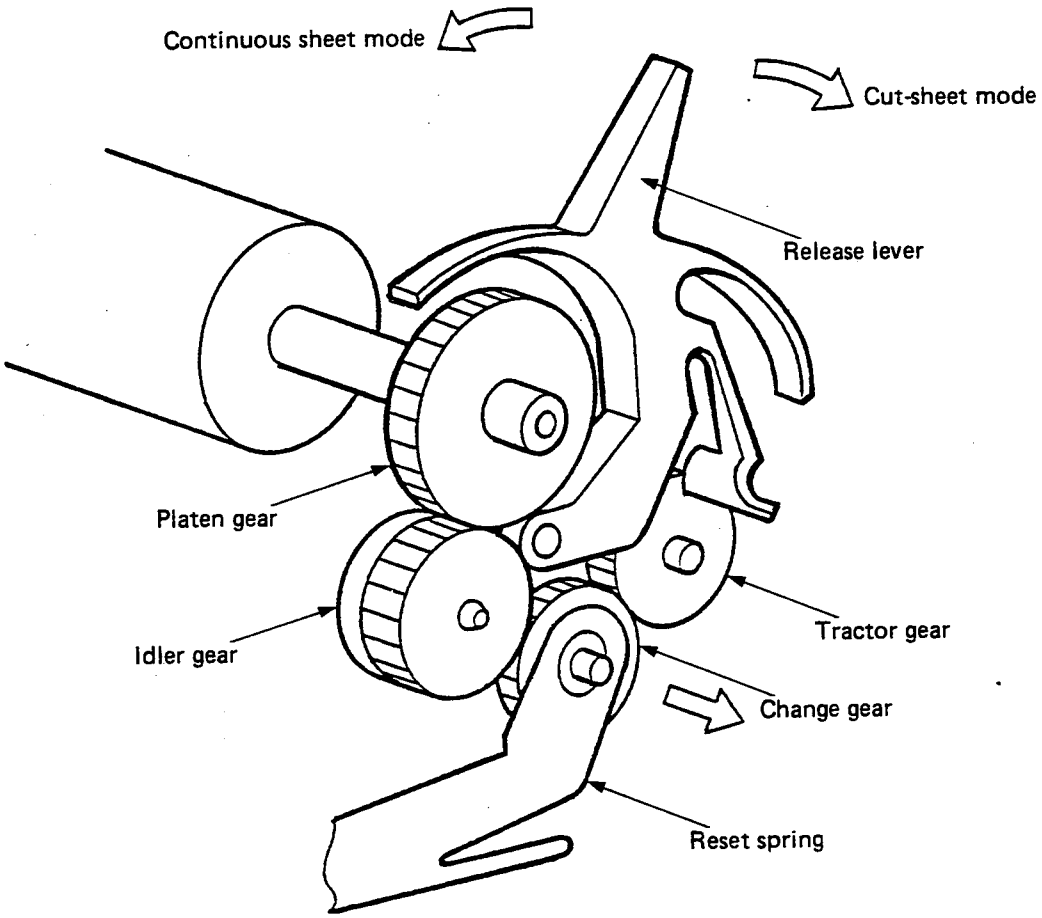


Figure 3-9

In other words, cut-sheets are fed by the rotation of the platen, but continuous sheets are not fed. When the release lever is moved forward, the change gear moves in the opposite direction to that of the arrow because the change gear is pressed against the reset spring. The rotation of the idler gear is then transmitted to the tractor gear and continuous sheets can be fed.

(4) Pull tractor mechanism (option) (See Figure 3-10.)

Bottom feed of continuous sheets is possible only when an optional pull tractor unit is installed.

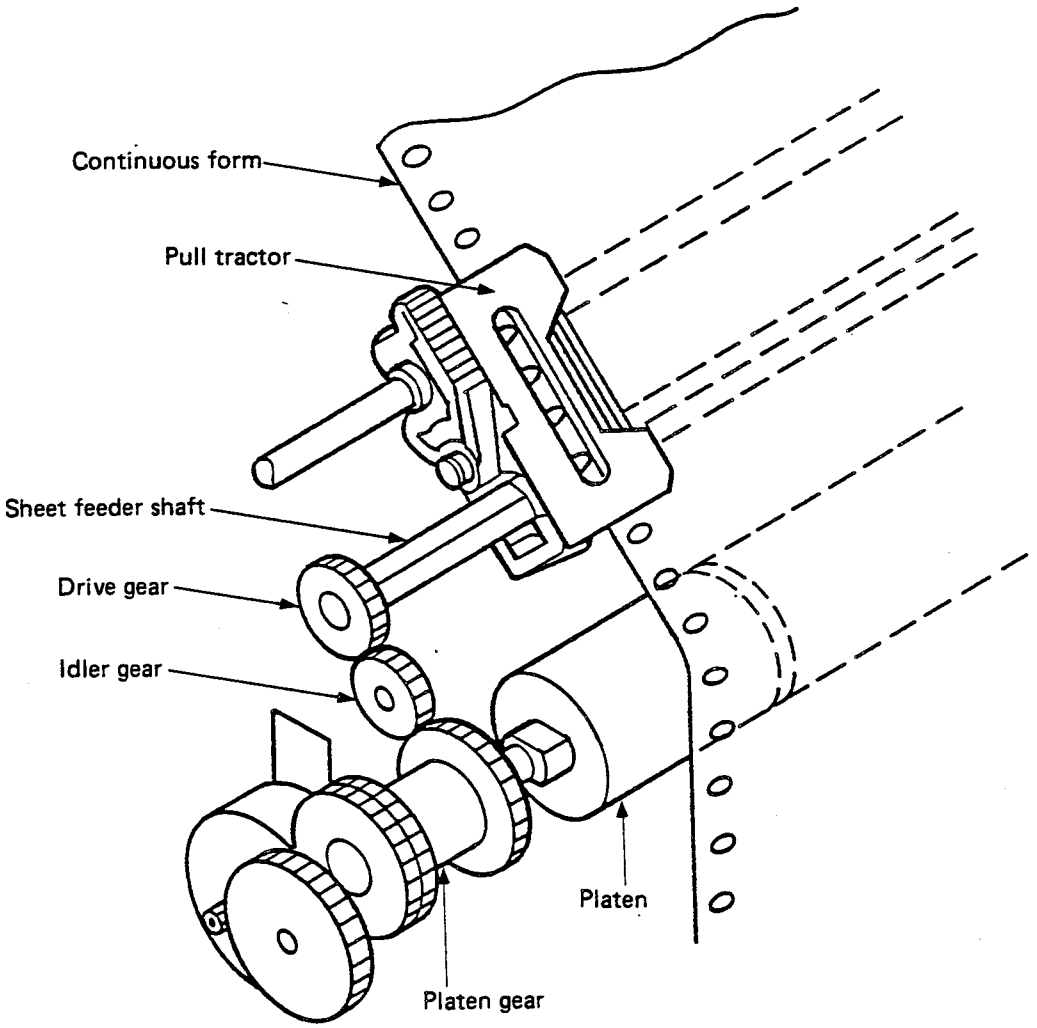


Figure 3-10

The rotation of the platen is transmitted to the idler gear of the pull tractor unit through the platen gear at the left end of the platen. The rotation of the idler gear is transmitted to the drive gear, and continuous sheet forms are fed by the pull tractor being rotated through the sheet feeder shaft.

(5) Push and pull tractor mechanism (option) (See Figure 3-11.)

This mechanism consists of an optional pull tractor and a standard push tractor mechanism. This mechanism can perform forward and reverse feed by setting continuous sheets to the push tractor and pull tractor.

The rotation of the platen is transmitted to the push tractor and the pull tractor. Sheets are fed by these two tractors at the same time.

To remove slack from the sheets, set the sheets according to the following procedure when using the push and pull tractors.

① Set the release lever to the continuous sheet side (setting the sheets to the push tractor to feed).

② Set the paper, which is fed in front of the platen, to the pull tractor.

③ Set the release lever to the cut-sheet side and feed paper using the platen knob.

④ If paper slack is removed, set the release lever to the continuous sheet side.

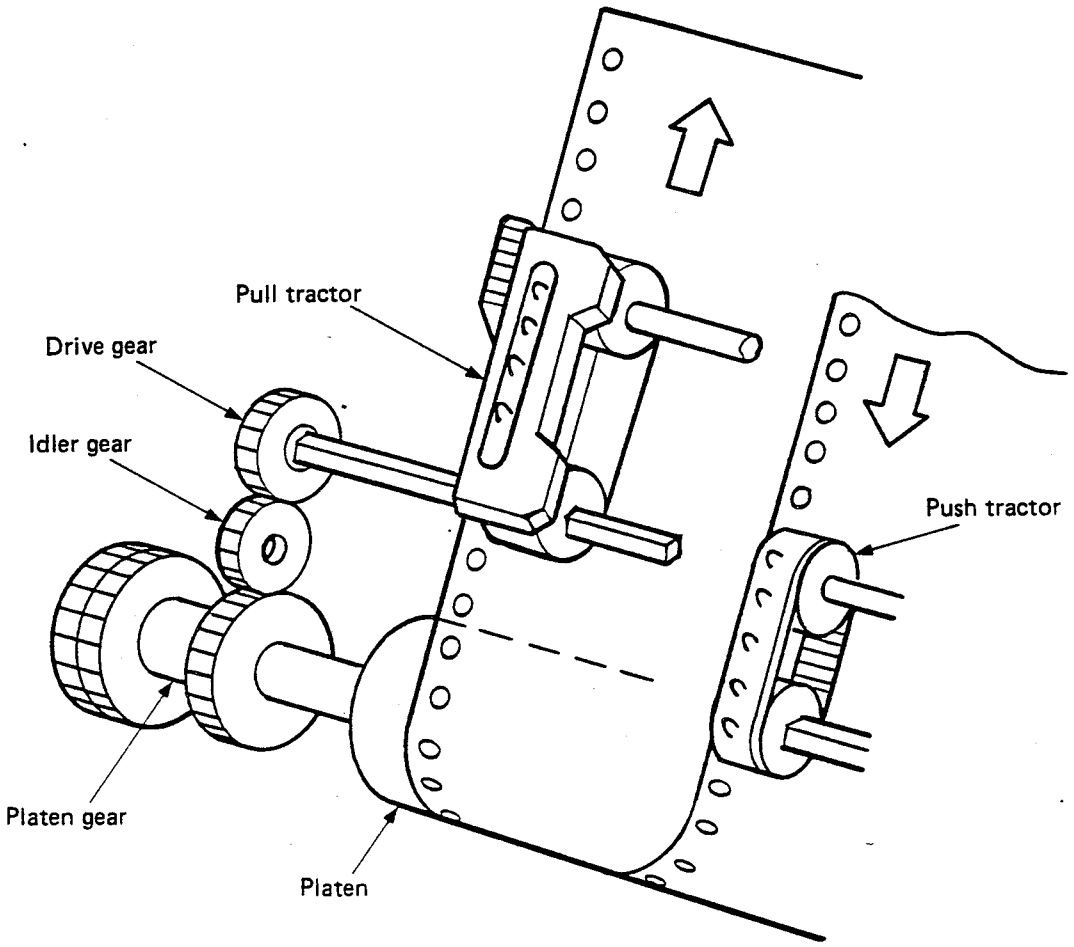


Figure 3-11

(6) **Paper clamp mechanism (See Figure 3-12.)**

When the release lever is pushed toward the open position, the release link rotates counterclockwise. This is because the protruding portion of the release lever escapes from the slot of the release lever; and the release shaft, which is engaged with this, rotates counterclockwise at the same time. A clearance is created between the pressure roller and the platen through which sheets can be inserted.

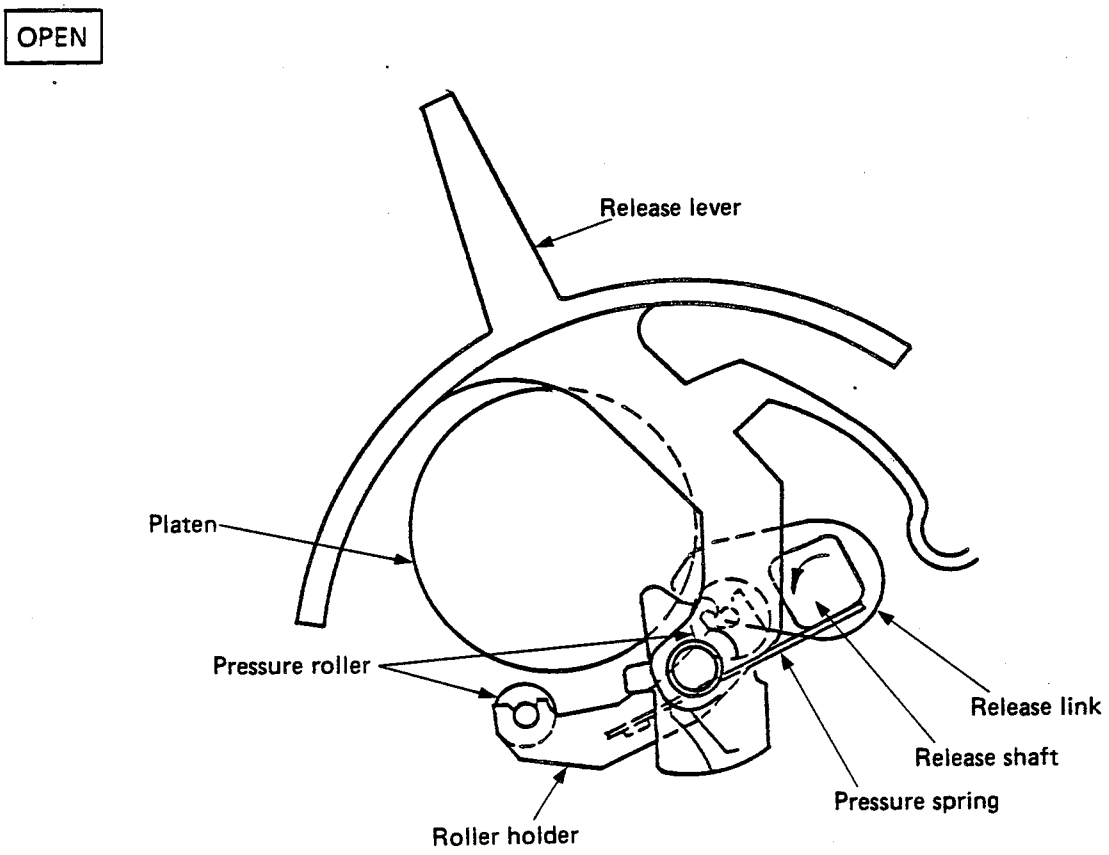


Figure 3-12 (a)

Conversely, if the release lever is locked in a closed position, the release link rotates clockwise. This is because the release link is pushed up by the protruding portion of the release lever and the release shaft, which is engaged with this, rotates clockwise at the same time. The pressure roller is pressed against the platen by the pressure spring welded to the release shaft, thus enabling feeding.

CLOSE

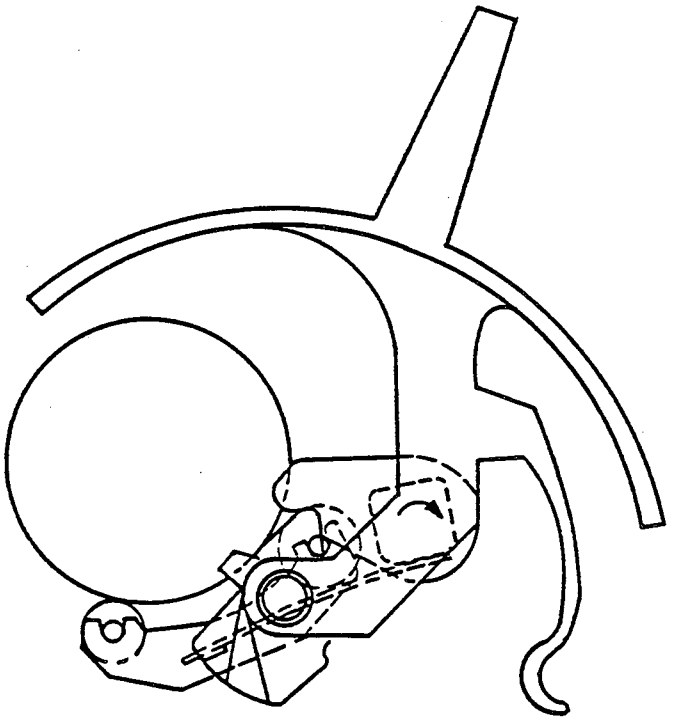


Figure 3-12 (b)

3.2.6 Paper end detection mechanism (See Figure 3-13.)

(1) Paper end for rear paper feed

When a sheet is inserted, tip A of paper end lever B is prevented, by the paper, from dropping into the slot of the paper shoot. The sensor lever is pushed up by pressure ⓐ, and the paper end sensor is thus turned on. If the paper is removed, tip A of paper end lever B drops into the slot of the paper shoot. At the same time the rear part of the sensor lever intercepts the sensor, turns it off, and detects a paper end. The paper end is detected with about 1 inch (25.4 mm) of paper remaining from the print position.

(2) Paper end for bottom paper feed

When a sheet is inserted, tip B of the paper end lever B is prevented from dropping into the slot of the bottom paper guide by the sheet, and the sensor lever is pushed up by pressure ⓑ and the paper end sensor comes on. If the paper is removed, tip part B of the paper end lever B drops into the slot of the bottom paper guide. At the same time the rear part of the sensor lever intercepts the sensor, it turns off and detects a paper end condition. The paper end is detected with about 1 inch (25.4 mm) of paper remaining from the print position.

(3) Cut-sheet end

When a sheet is inserted, the paper prevents the tip of the paper end lever from dropping into the slot of the platen. The sensor lever is pushed up by pressure ⓒ, and the sensor is turned on.

If the sheet is removed, the paper end lever drops into the slot of the platen, the rear part intercepts the sensor at the same time, turns it off and detects a paper end. The paper end is detected with about 1 inch (25.4 mm) of the sheet remaining from the print position.

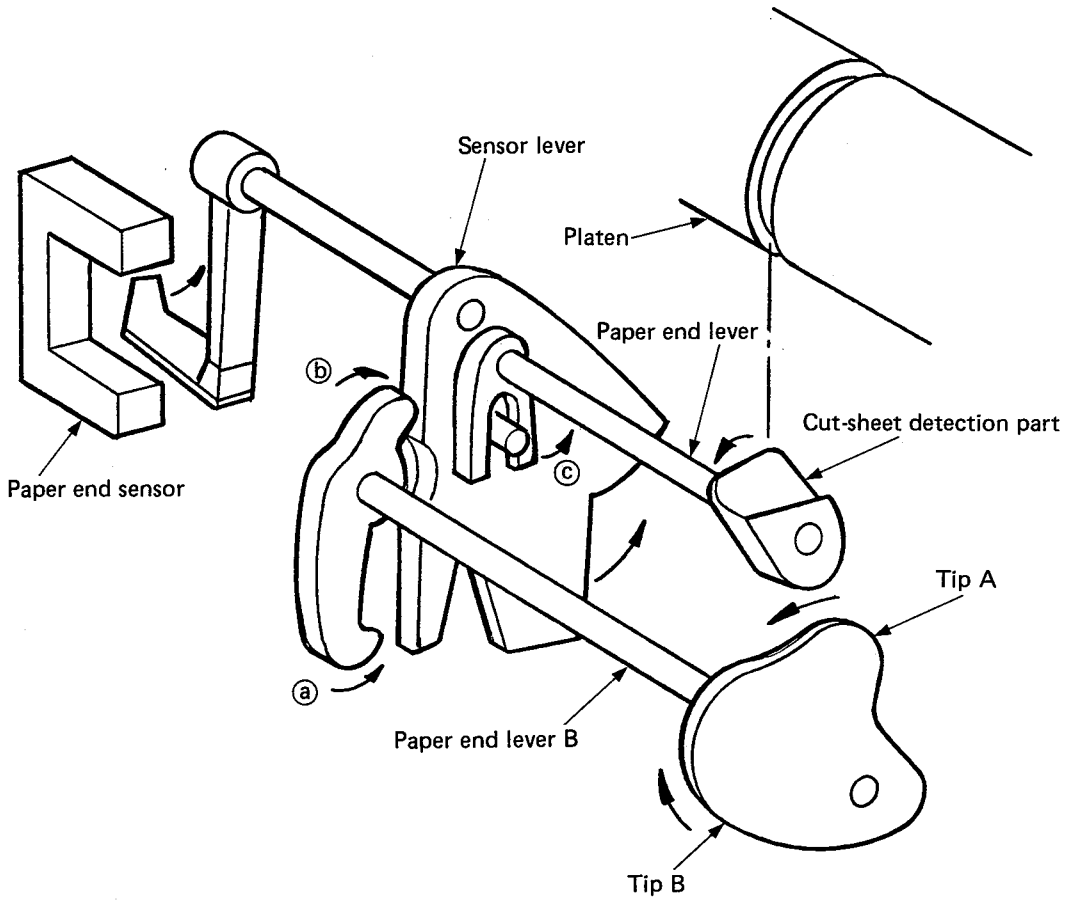

Sensor lever
Platen
Paper end lever
Cut-sheet detection part
Paper end sensor
ⓑ
ⓒ
Tip A
ⓐ
Paper end lever B
Tip B

Figure 3-13

3.2.7 Semi-automatic sheet feed (SASF) operation (See Figure 3-14.)

This function sets the print start position of the paper automatically when using cut-sheet and continuous sheet paper.

The procedures of operation are as follows:

(1) When using cut-sheets (SASF)

① Set the release lever to the cut-sheet side (rear side).

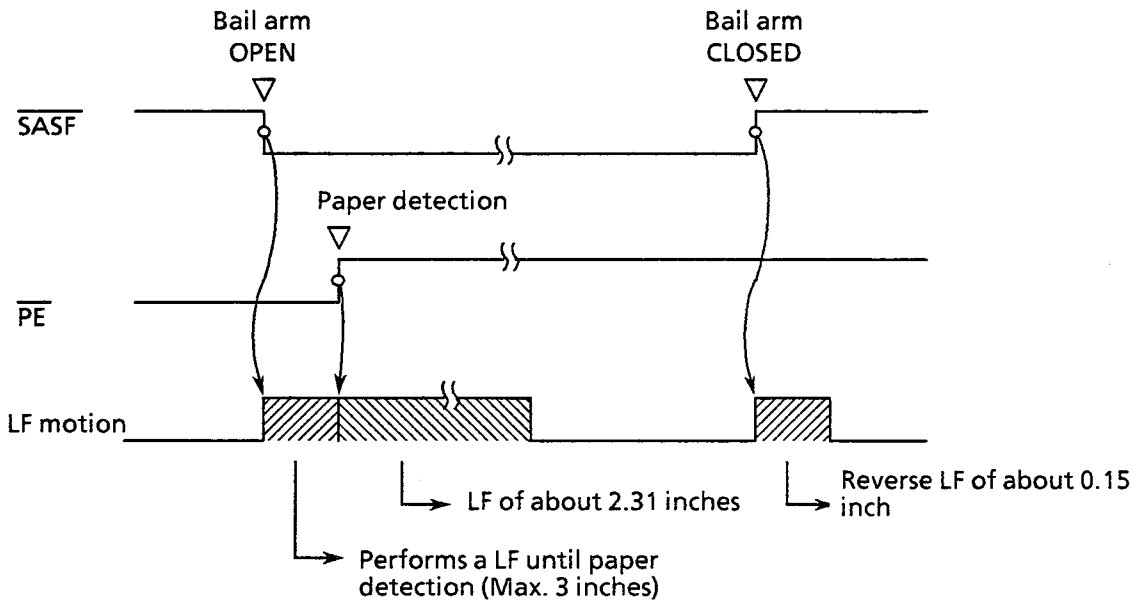
② Insert paper from behind the platen.

③ Pull the bail arm forward to set it to the open state, causing the SASF switch to be turned on.

④ LF operation is started and paper will be fed into the printer.

⑤ About 2.31 inches of a new sheet are fed after paper detection.

⑥ If the bail arm is returned to the original position, a reverse LF of about 0.15 inches is performed.



When the bail arm is set open, the LF motor is driven to feed 3 inches of paper. When the LF motor drive has finished this, and if a sheet has not been fed, the SASF motion becomes invalid and is handled as an ordinary paper end.

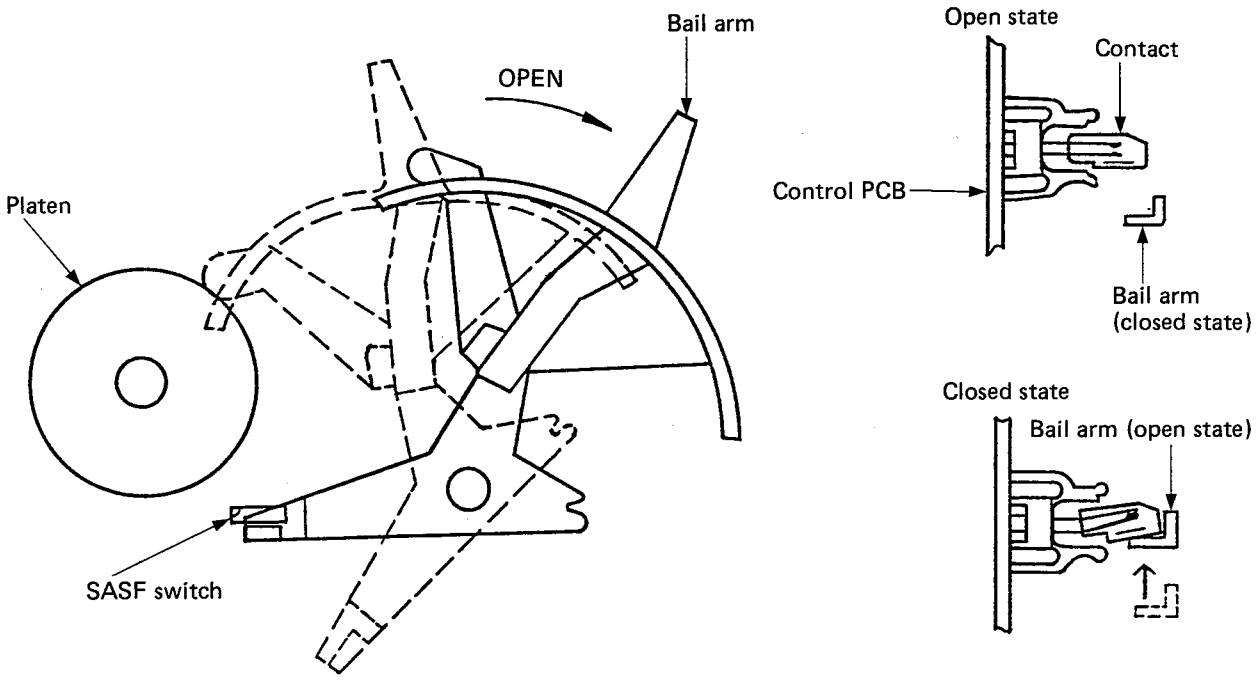


Figure 3-14

(2) When using continuous sheets (rear feed) (auto load)

① Set the release lever to the continuous sheet side.

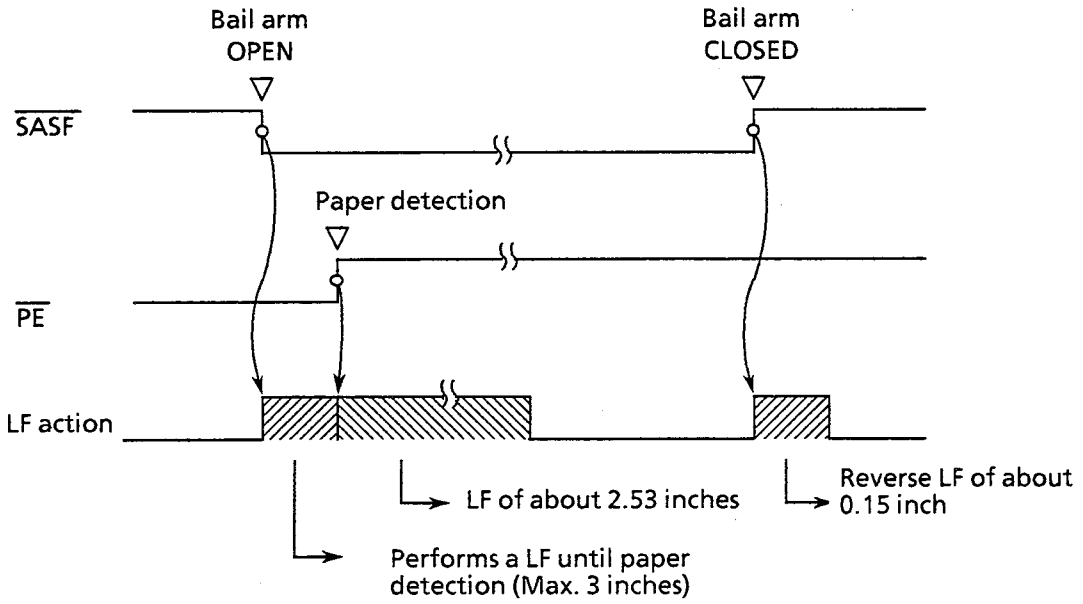
② Insert the paper in the push tractor.

③ Push the bail arm forward to the open state, turning on the SASF switch.

④ The LF action is started, and sheets will be fed into the printer.

⑤ About 2.53 inches of the sheet is then fed after paper detection.

⑥ When the bail arm is returned to the original position, a reverse LF of about 0.15 inch is performed. The position is about one inch from the top of the sheet for the print start line.



When the bail arm is set to open, the LF motor is driven to feed 3 inches of paper. When the LF motor drive has finished this, and if a sheet has not been fed, the auto load action becomes invalid and is handled as an ordinary paper end.

3.2.8 Reversing continuous sheets

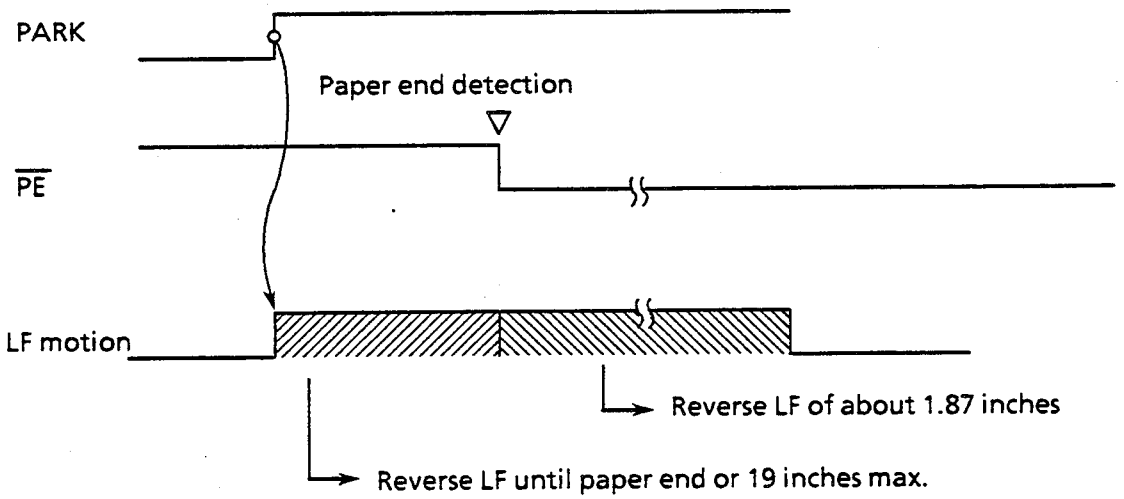
Continuous sheets which have been inserted can be reversed automatically by using the park button on the operation panel.

Its operation is as follows:

① Press the park button on the operation panel.

② Reverse LF is started and the sheet is fed reversely until paper end or 19 inches maximum is detected.

③ About 1.87 inches of the sheet is fed reversely after paper end, then the top of the sheet stops while still on the push tractor.



4. ASSEMBLY/DISASSEMBLY

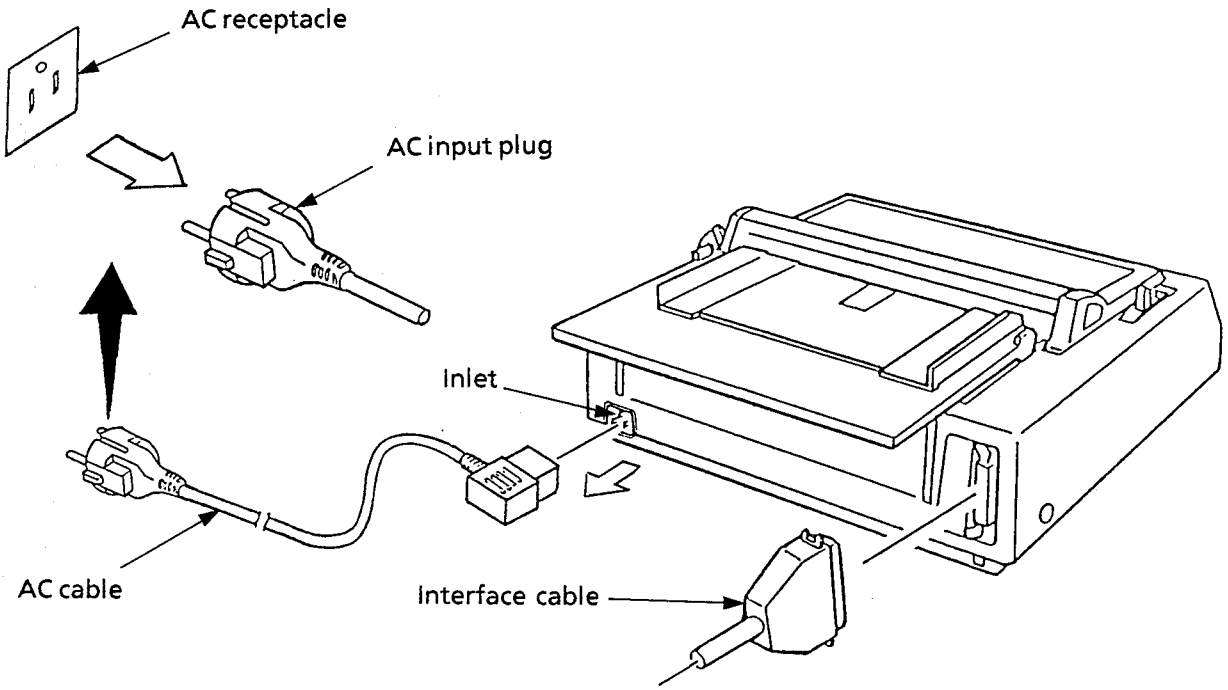
4. ASSEMBLY/DISASSEMBLY

4.1 Precautions for Parts Replacement

(1) Before making the assembly and disassembly, be sure to remove the AC cable and interface cable.

(a) After turning OFF the AC power switch, pull out the AC input plug of the AC cable from the AC receptacle and then the AC cable from the inlet on the printer side.

(b) When the AC cable is connected again, first connect the cable to the inlet on the printer side and then the AC input plug to the AC receptacle.



(2) Do not disassemble the printer as long as it is in good operating condition.

(3) Be careful not to remove parts unless necessary. Disassembly should be kept to the necessary minimum.

(4) Use only the specified maintenance tools.

(5) Disassemble the printer in the specified order, otherwise parts may be damaged.

(6) In the course of disassembly, it may be a good idea to keep the removed small parts such as screws and washers by temporarily attaching them to their original places so as not to lose them.

(7) ICs such as the microprocessor, ROM, and RAM can easily be damaged by static electricity. Do not wear gloves that are apt to produce static electricity when handling printed-circuit boards.

(8) Do not place the printed-circuit boards directly on the printer or the floor.

4.2 Maintenance Tools

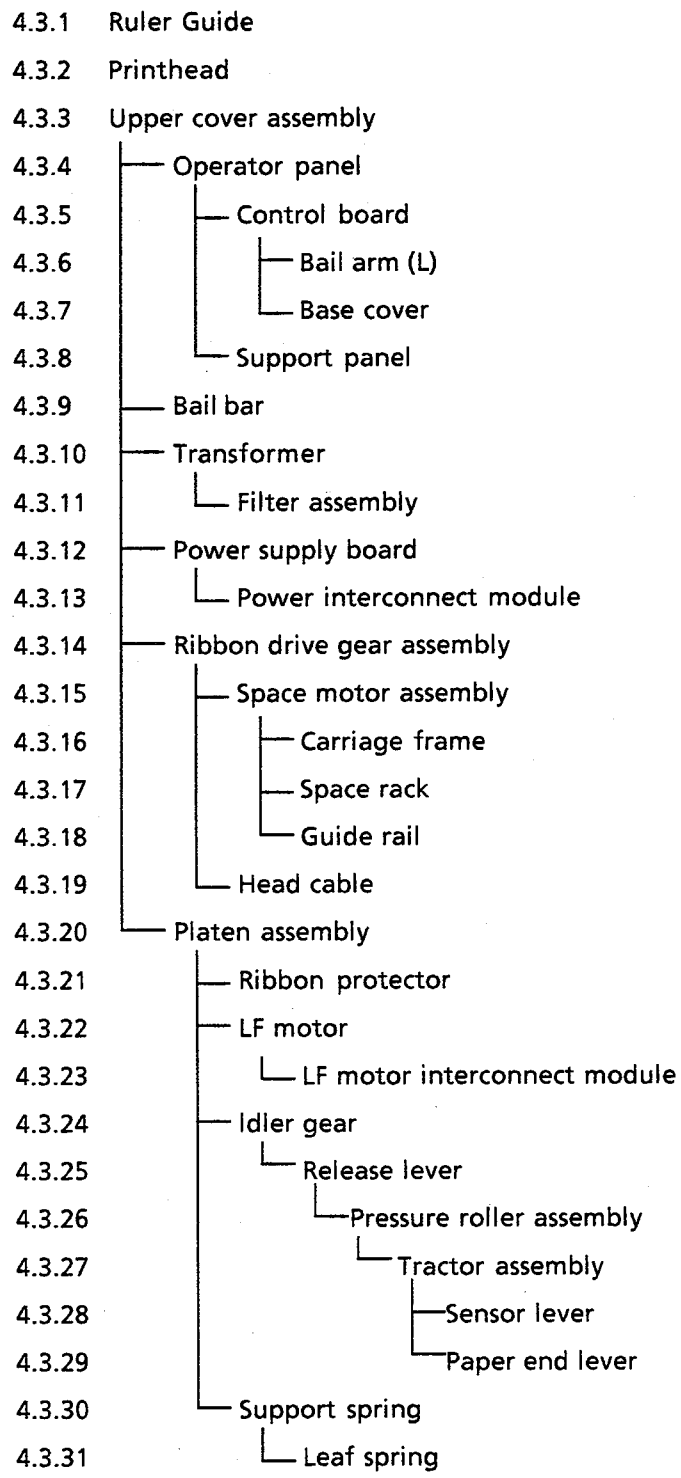
The tools required in replacing printed circuit boards and other parts in the field are shown in Table 4-1. Tools other than those mentioned below may be necessary for other maintenance procedures.

Table 4-1 Maintenance tools

No.	Maintenance tool	Quantity	Purpose of tool	Remarks
1	Screwdriver No. 1-200	1		
2	Phillips screwdriver No. 2-200	1	3-to 5-mm screws	
3	Screwdriver No. 3-100	1		
4	Cutters No. 5H	1		
5	Round pliers No. 1	1		
6	Thickness gauge set	1	For head gap adjustment	Include Final Specs.
7	Volt-ohm-milliammeter	1		

4.3 Disassembly/Reassembly Procedure

This manual explains the methods for detaching and attaching the assemblies shown in the following disassembly diagrams. The procedures explained apply to detaching the assemblies. Reverse the procedures, when attaching the assemblies.

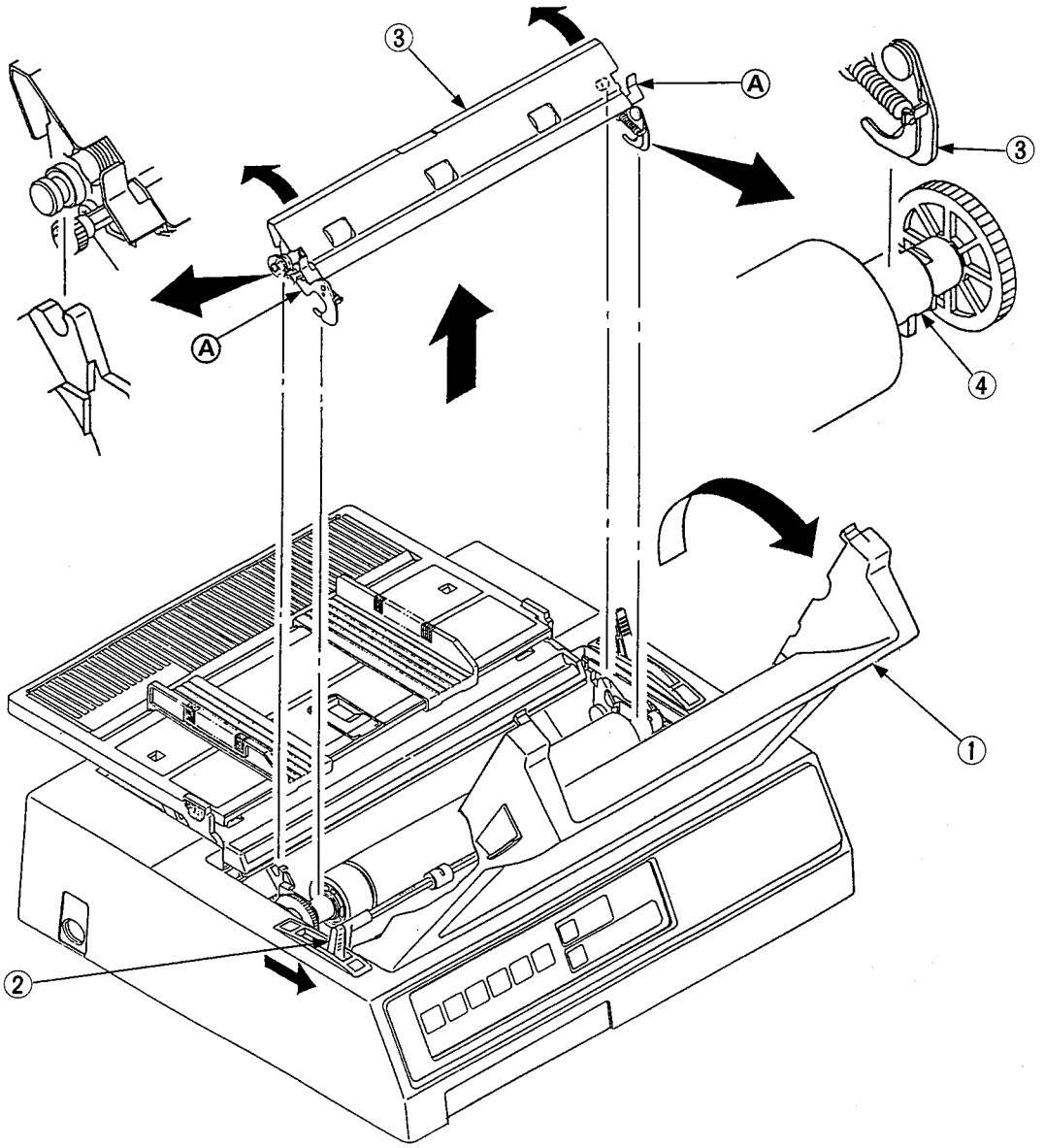


4.3.1 Ruler Guide

(1) Open access cover ① .

(2) Tilt bail lever ② forward.

(3) Tilt ruler guide ③ backward by lock lever Ⓐ to release it from the platen assembly shaft ④ .

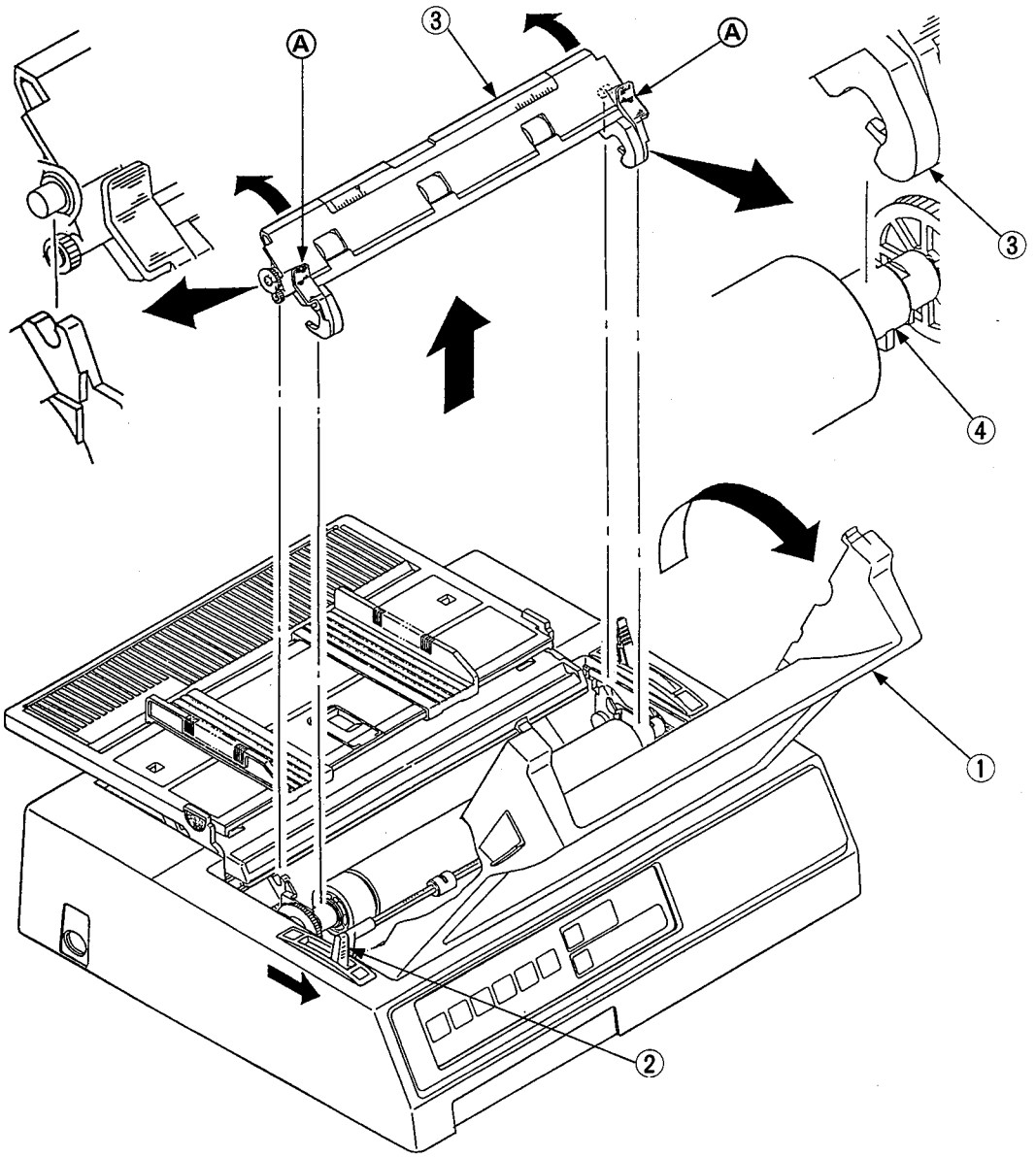


4.3.1 Ruler Guide

(1) Open access cover ① .

(2) Tilt bail lever ② forward.

(3) Tilt ruler guide ③ backward by lock lever Ⓐ to release it from the platen assembly shaft ④ .



4.3.2 Printhead

(1) Open the access cover ① .

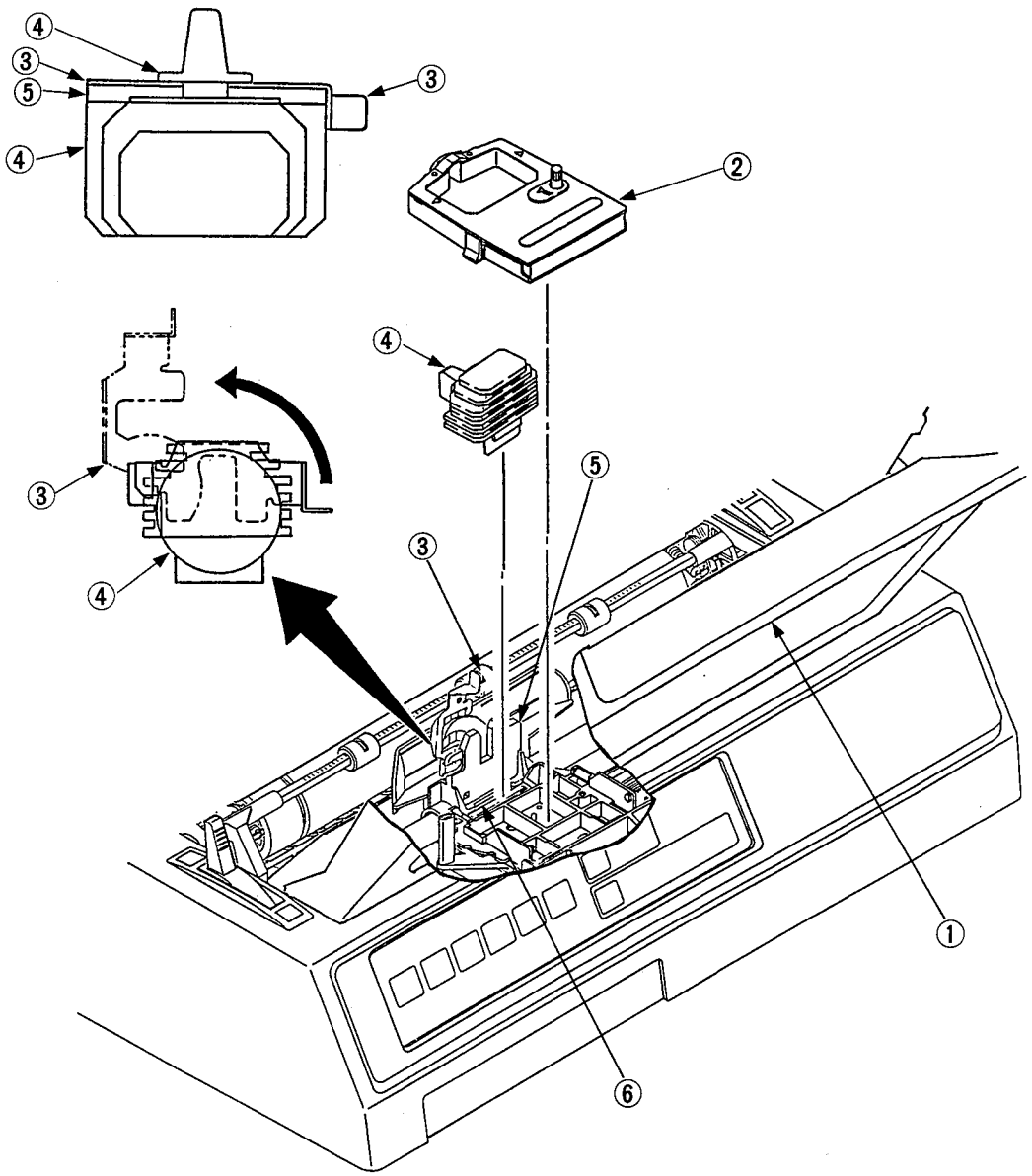
(2) Remove the ribbon cassette ② .

(3) Lift the head clamp ③ 90° to the left to unlock the printhead ④ .

(4) Remove the printhead ④ from the carriage frame ⑤ .

[Notes on installation]

1. *Push the printhead ④ into the connector ⑥ while attaching it to the carriage frame ⑤.*
2. *Insert the head clamp ③ securely between the printhead ④ and the carriage frame ⑤.*



4.3.3 Upper cover assembly

(1) Detach the platen knob ①.

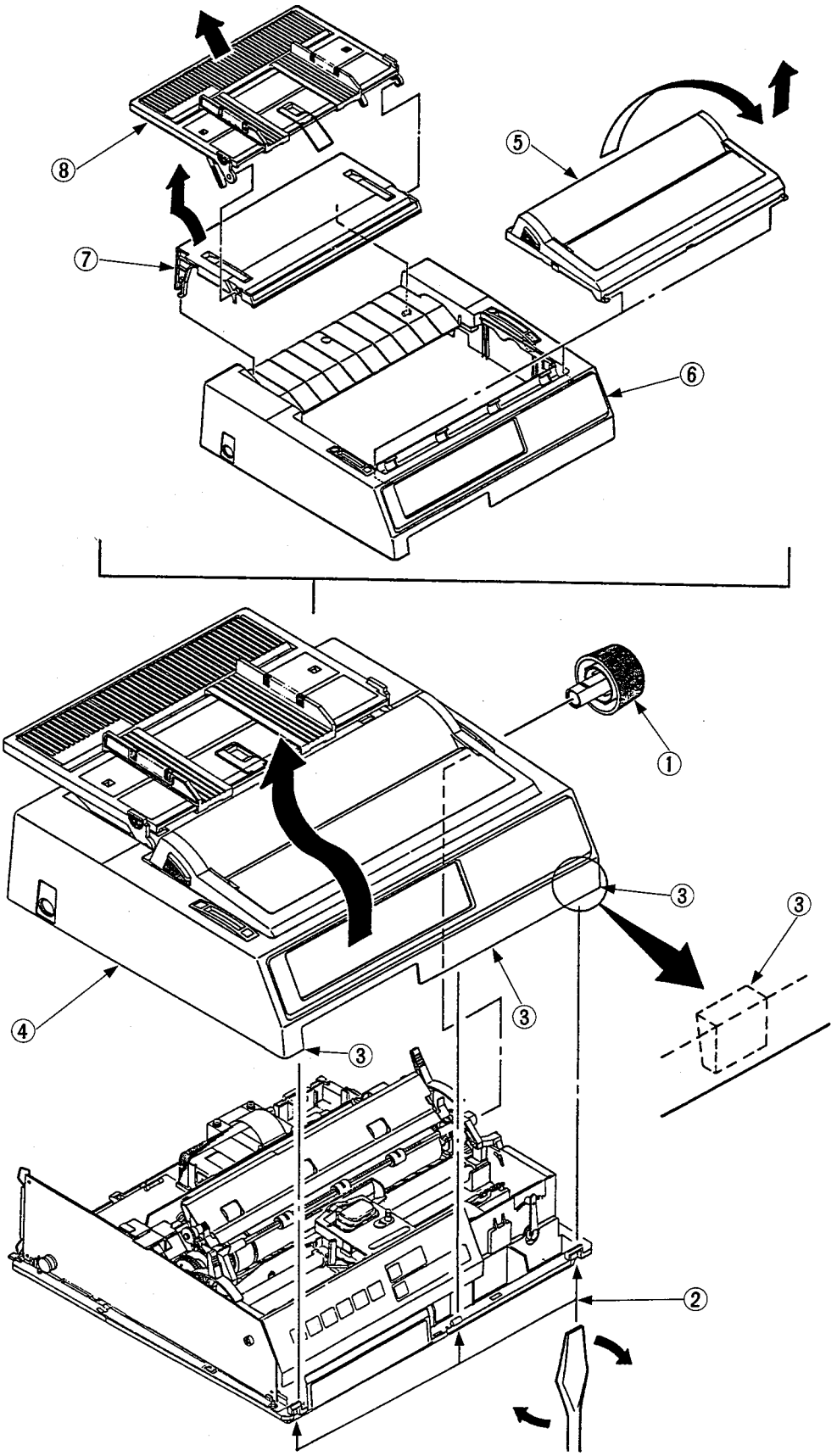
(2) Insert a flat-blade screwdriver through the three slots ② in the main frame and disengage the claw ③ of the upper cover.

(3) Lift the front of the upper cover ④ and detach it by pushing backward and pulling up.

(4) Open and take out the access cover ⑤ from the middle cover ⑥.

(5) Detach the sheet separator ⑧ from the rear cover ⑦.

(6) Detach the rear cover ⑦ from the middle cover ⑥.


⑧
⑤
⑦
⑥
①
③
③
③
④
③
②

4.3.5 Control board

(See 4-11 for the illustration.)

(1) Detach the operation panel. (See 4.3.4 step (2).)

(2) Turn the locking post ① 90° clockwise to unlock it.

(3) Push the board clamp ② upward and pull the control board ③ to the left.

(4) Slant the control board ③ 45° and pull it out upward.

(5) Detach the printhead cable ⑤ from the connector ④. Pull Black connector ④ away from the control board before pulling printhead cable out.

[Notes on installation]

1. *Do not touch the exposed terminals (crimp terminals Ⓐ) in the connector and cotrol boad ③. Protect these terminals from dirt and dust.*
2. *Attach the board so that the following parts are securely connected. Guide Ⓑ, Power contact Ⓒ, Connection plate Ⓓ, Guide Ⓔ, Guide Ⓕ, Sensor Lever Ⓖ.*
3. *Install a piece of paper into the printer to prevent sensor lever Ⓖ to touch with the paper end sensor, and install the control board with the sensor lever Ⓖ pressed down.*
4. *Insert the head cable fully to the connector ④.*

4.3.5 Control board

(See 4-10-2 for the illustration.)

(1) Detach the upper cover assembly. (See 4.3.3 step (3).)

(2) Turn the locking post ① 90° clockwise to unlock it.

(3) Push the board clamp ② upward.

(3)' Lift the nail ⑥ of operator panel from and pull the control board ③ to the left.

(4) Slant the control board ③ 45° and pull it out upward.
Detach the code clamp (7) and pull out the connector (8).

(5) Detach the printhead cable ⑤ from the connector ④. Pull Black connector ④ away from the control board before pulling printhead cable out.

[Notes on installation]

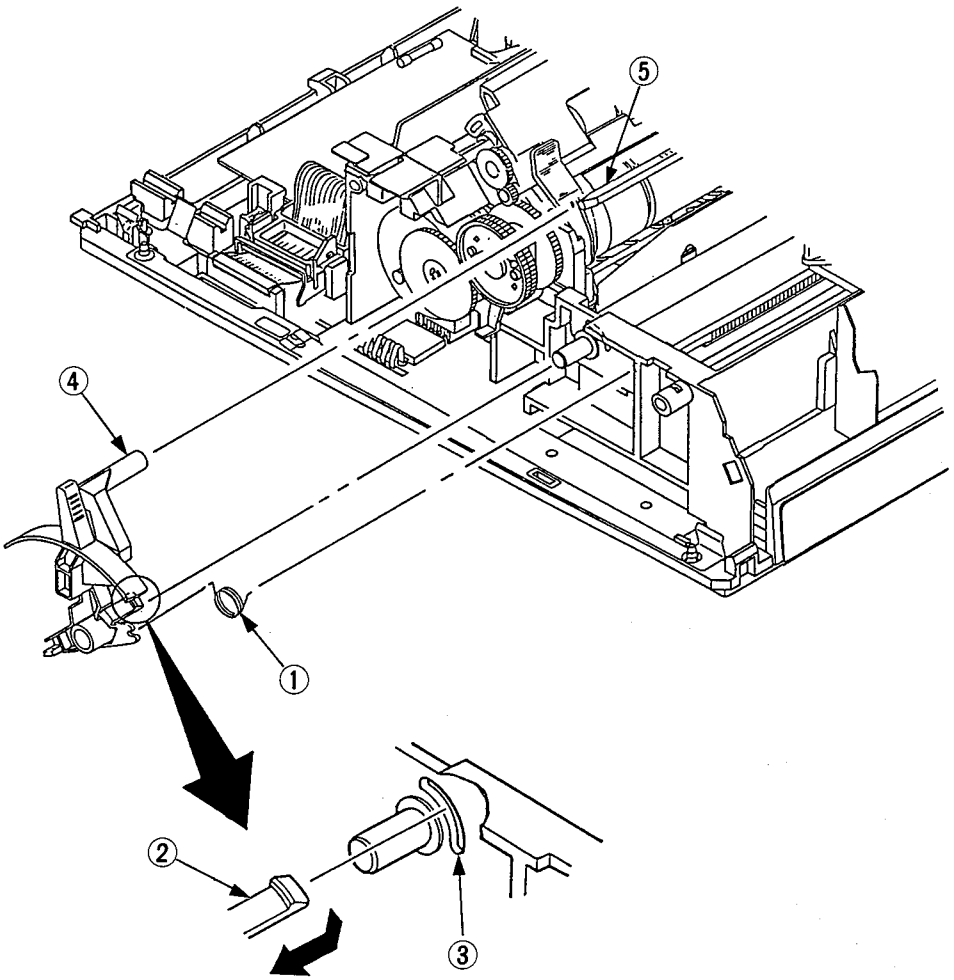
1. *Do not touch the exposed terminals (crimp terminals Ⓐ) in the connector and control boad ③. Protect these terminals from dirt and dust.*
2. *Attach the board so that the following parts are securely connected. Guide Ⓑ, Power contact Ⓒ, Connection plate Ⓓ, Guide Ⓔ, Guide Ⓕ, Sensor Lever Ⓖ.*
3. *Install a piece of paper into the printer to prevent sensor lever Ⓖ to touch with the paper end sensor, and install the control board with the sensor lever Ⓖ pressed down.*
4. *Insert the head cable fully to the connector 4.*

4.3.6 Bail arm (L)

(1) Detach the control board. (See 4.3.5.)

(2) Detach the bail arm spring (L) ① with pliers.

(3) Push the claw ② outward and detach the bail arm (L) ④ by pulling it from the guide hole ③ in the main chassis (the arm is also detached from the bail bar ⑤).



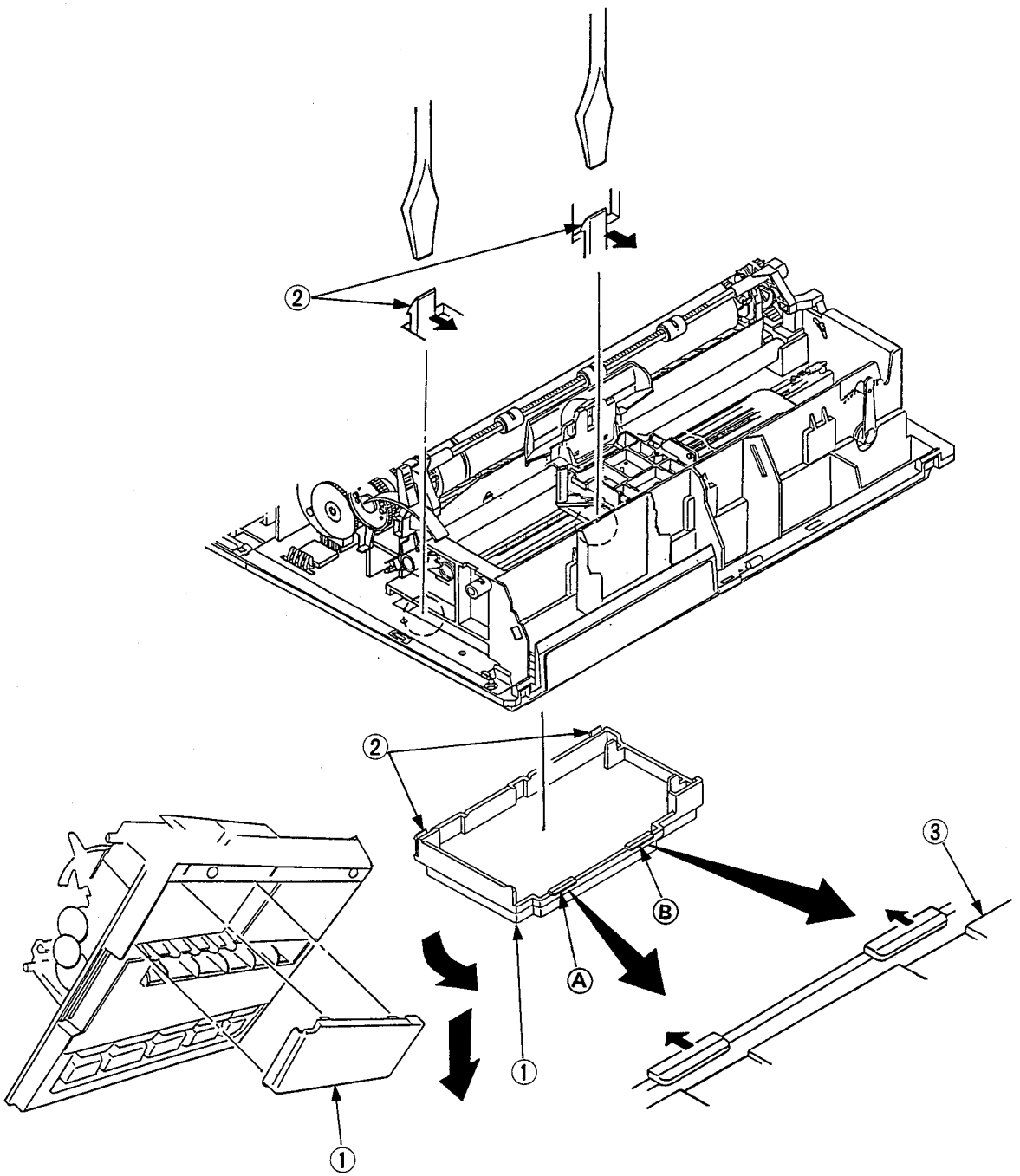
4.3.7 Base cover

(1) Lift the main frame forward, so that you can see the back side of it.

(2) Pull the two claws ② of the base cover ① forward to unlock it, then press the claws ② down to detach the base cover ①.

[Note on installation]

Insert the claws Ⓐ and Ⓑ on the base cover ① into the main frame ③. Then, attach the cover while fitting the claws ②.



4.3.10 Transformer

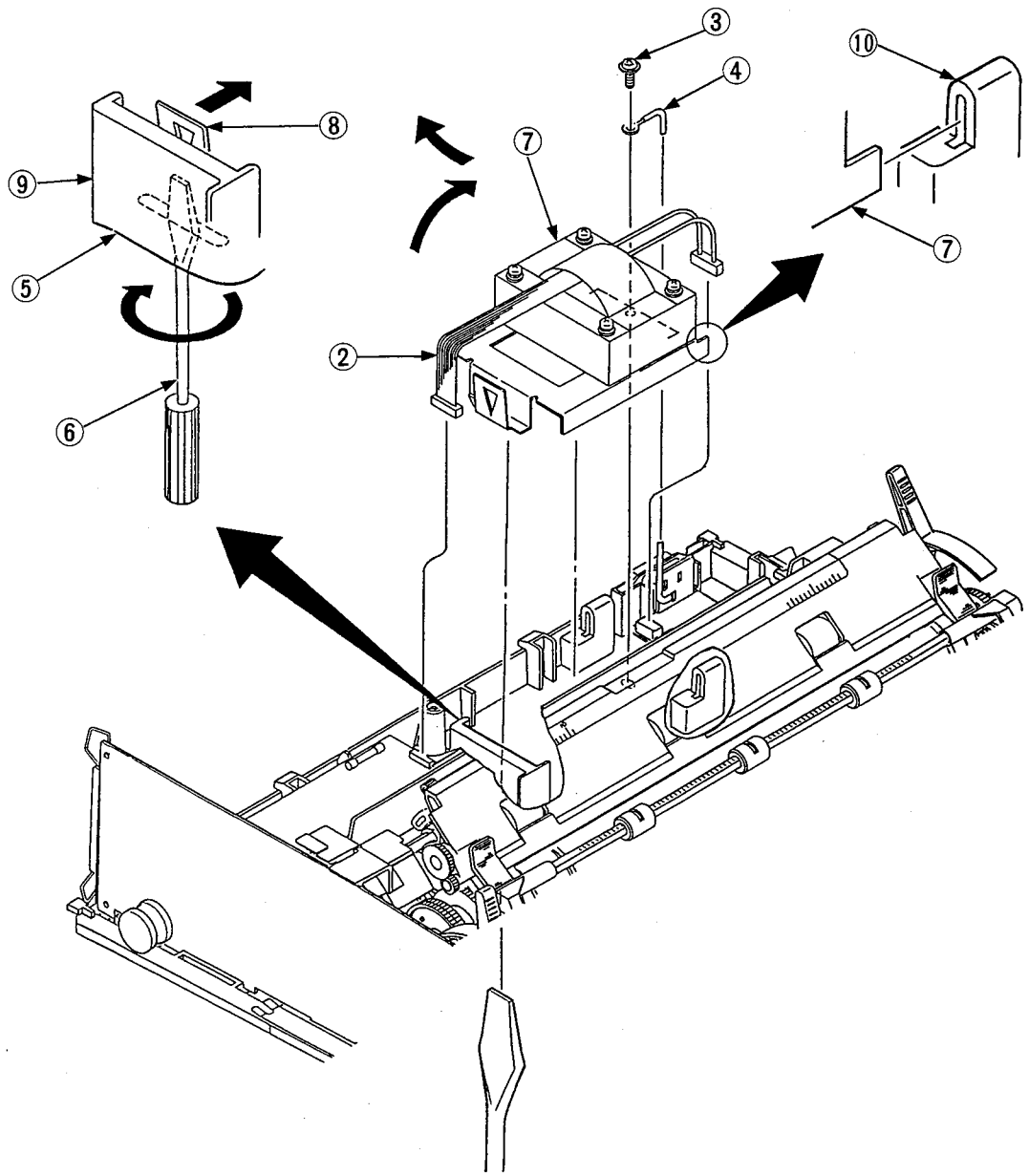
(1) Detach the upper cover assembly. (See 4.3.3 (3).)

(2) Disconnect the cable ① from the filter assembly and cable ② from the power supply board.

(3) Detach the screw ③ and grounding cord ④ .

(4) Insert a flat-blade screwdriver ⑥ into the main frame ⑤ from under the back, pull the screwdriver to push the lock spring ⑧ to the right on the transformer and detach the spring ⑧ from the transformer clamp A ⑨ .

(5) Lift the left side of the transformer ⑦ and detach it from the transformer clamp B ⑩ by pulling it to the left.

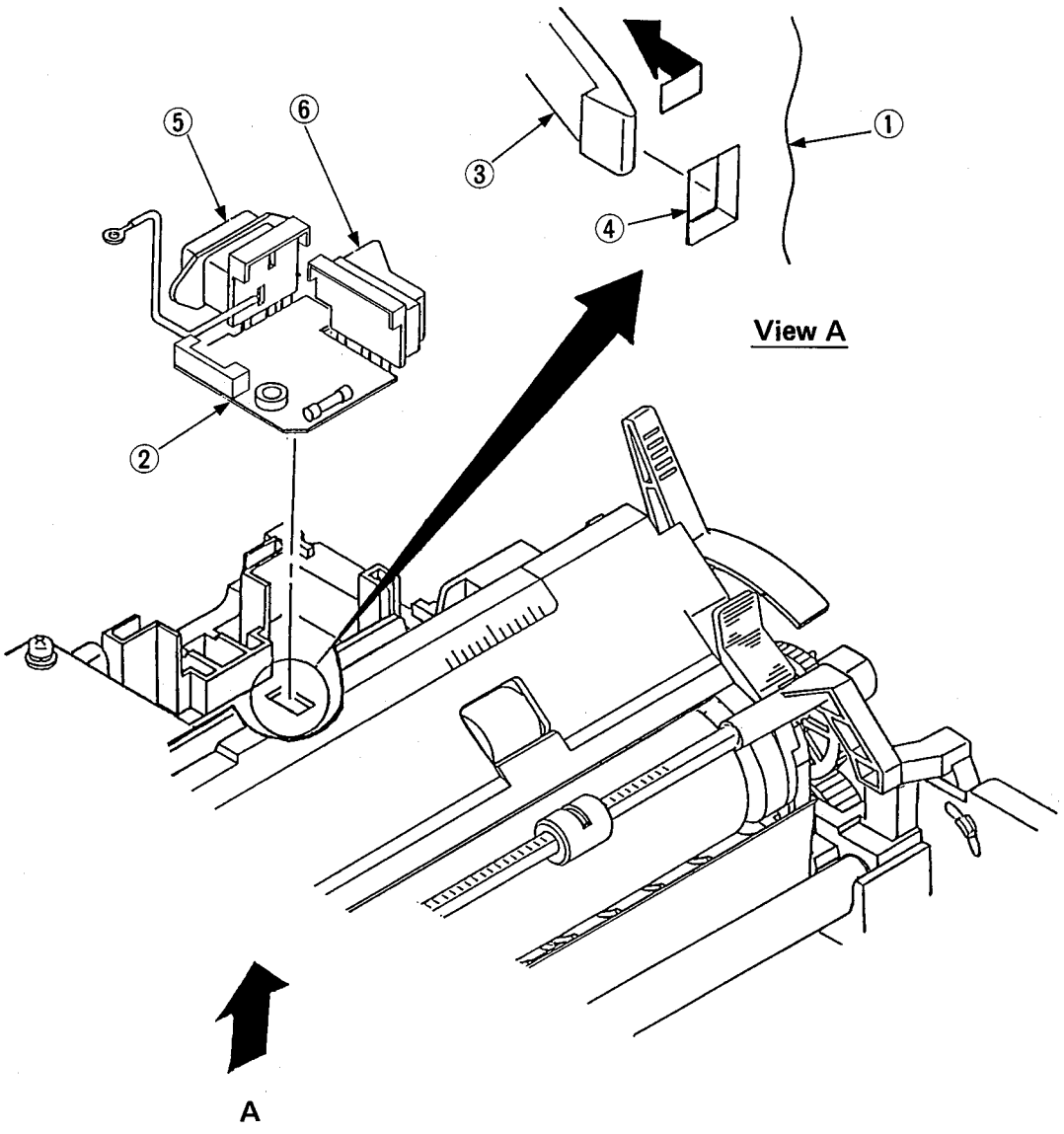


4.3.11 Filter assembly

(1) Detach the transformer. (See 4.3.10.)

(2) Detach the claw ③ of the filter assembly ② from its locking position ④ by pushing it from the bottom of the main frame ①.

(3) Detach the filter assembly ② by lifting the AC inlet ⑤ and AC POWER switch ⑥ from the guide of the main frame.

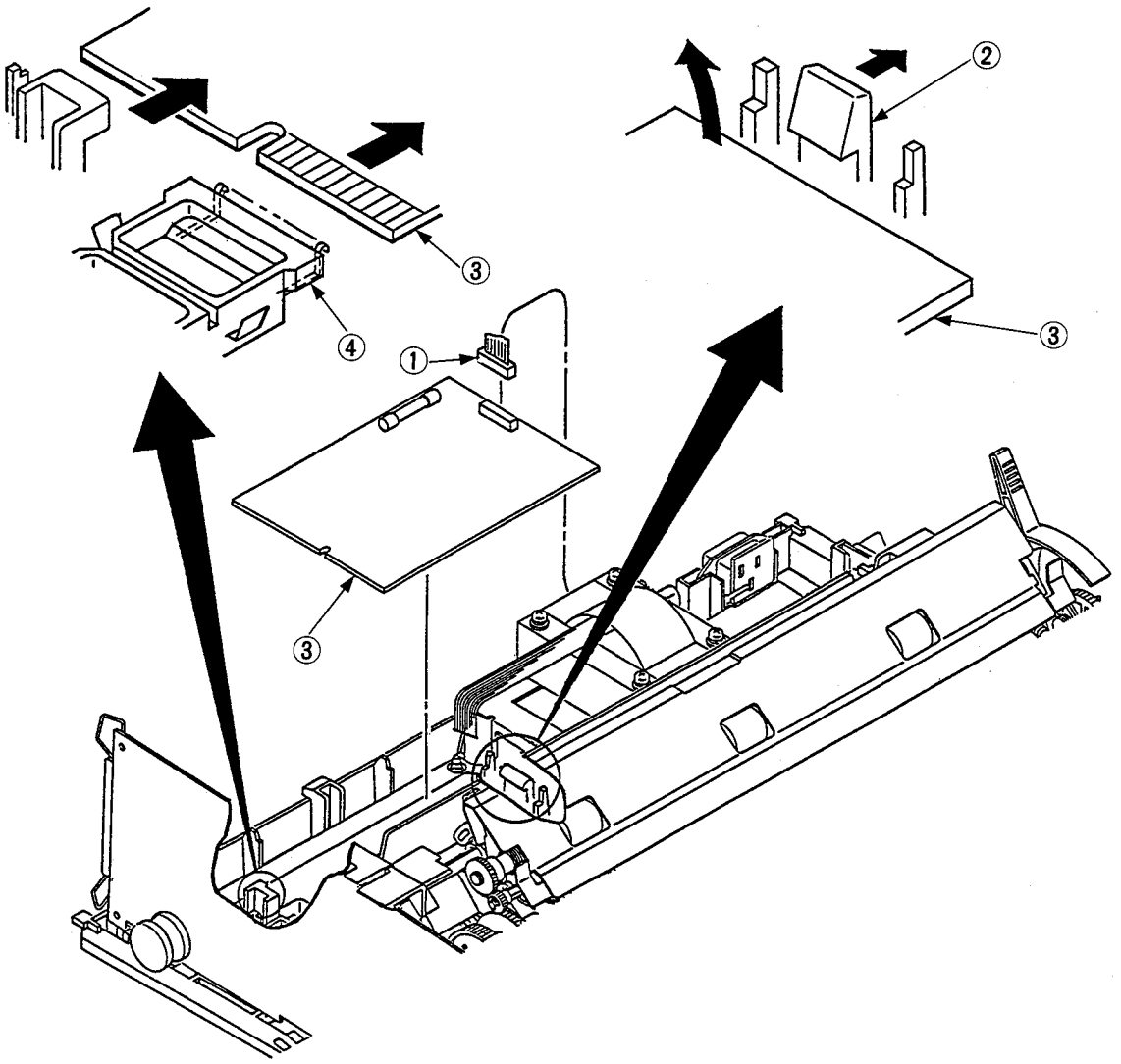


4.3.12 Power supply board

(1) Detach the upper cover assembly. (See 4.3.3 (3).)

(2) Disconnect the transformer cable ①.

(3) Push the board clamp claw ② to the right, lift the right side of the power supply board ③, and detach its left side from the power contact ④.

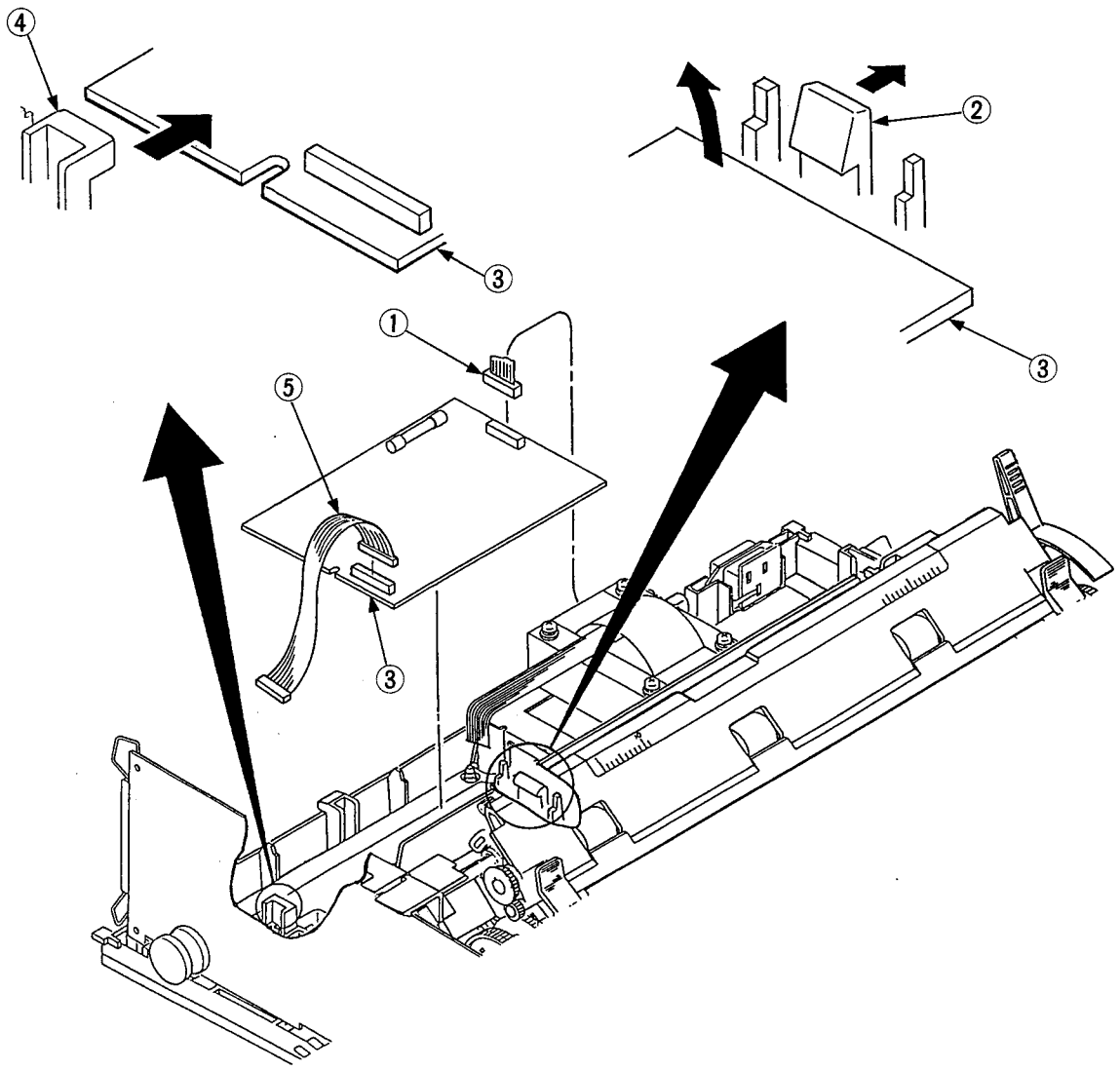


4.3.12 Power supply board

(1) Detach the upper cover assembly. (See 4.3.3 (3).)

(2) Disconnect the transformer cable ① and conector code ⑤.

(3) Push the board clamp claw ② to the right, lift the right side of the power supply board ③, and detach its left side from the PCB holder.

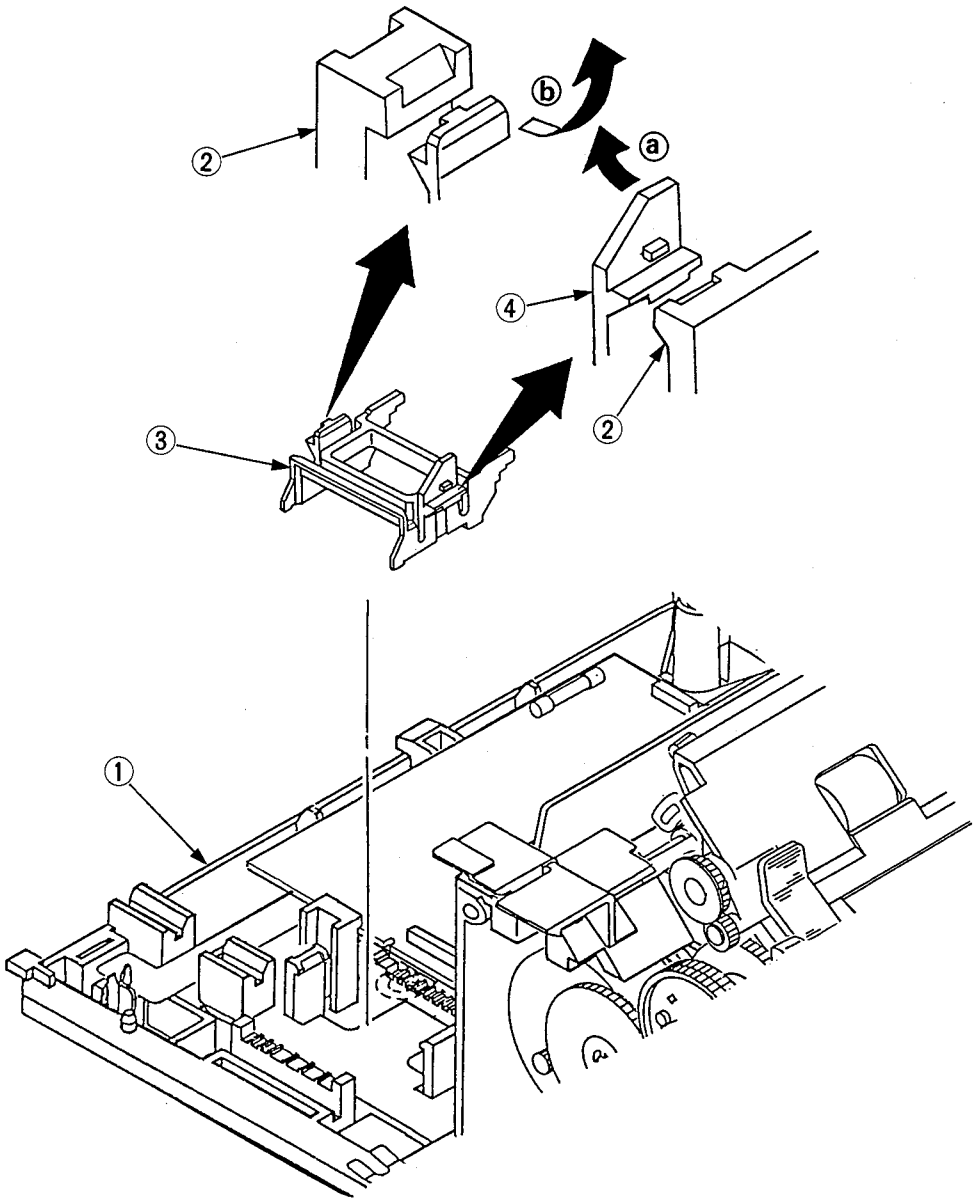


4.3.13 Power interconnect module

(1) Detach the control board. (See 4.3.5.)

(2) Detach the power supply board. (See 4.3.12.)

(3) Detach the code cramp ③ by detaching the locking springs ④ on the module from the module clamps ② on the main frame ① (in the order of Arrows ⓐ, ⓑ).

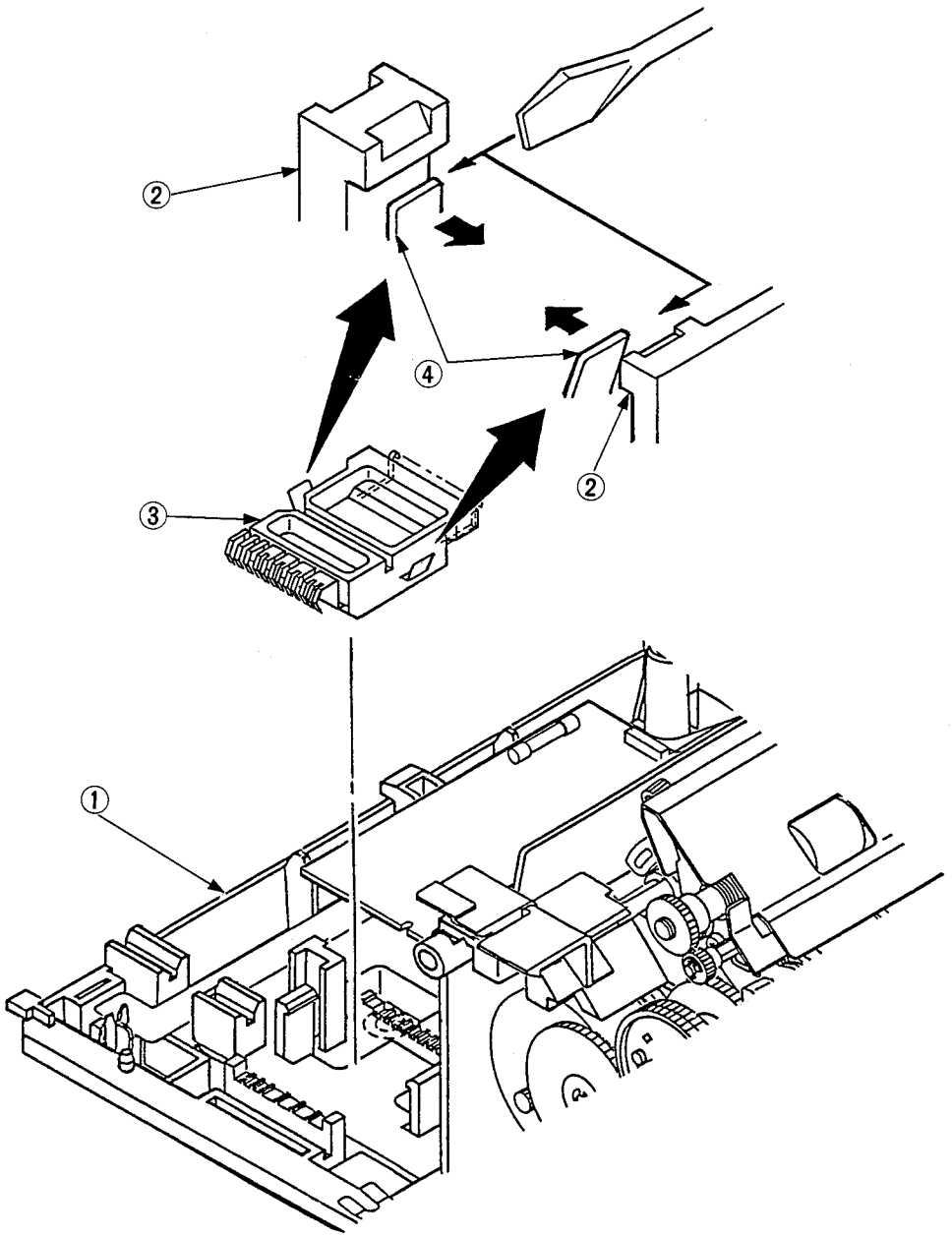


4.3.13 Power interconnect module

(1) Detach the control board. (See 4.3.5.)

(2) Detach the power supply board. (See 4.3.12.)

(3) Detach the power interconnect module ③ by detaching the locking springs ④ on the module from the module clamps ② on the main frame ①.



4.3.14 Ribbon drive gear assembly

(1) Detach the upper cover Assembly. (See 4.3.3 (3).)

(2) Detach the ribbon cassette ①.

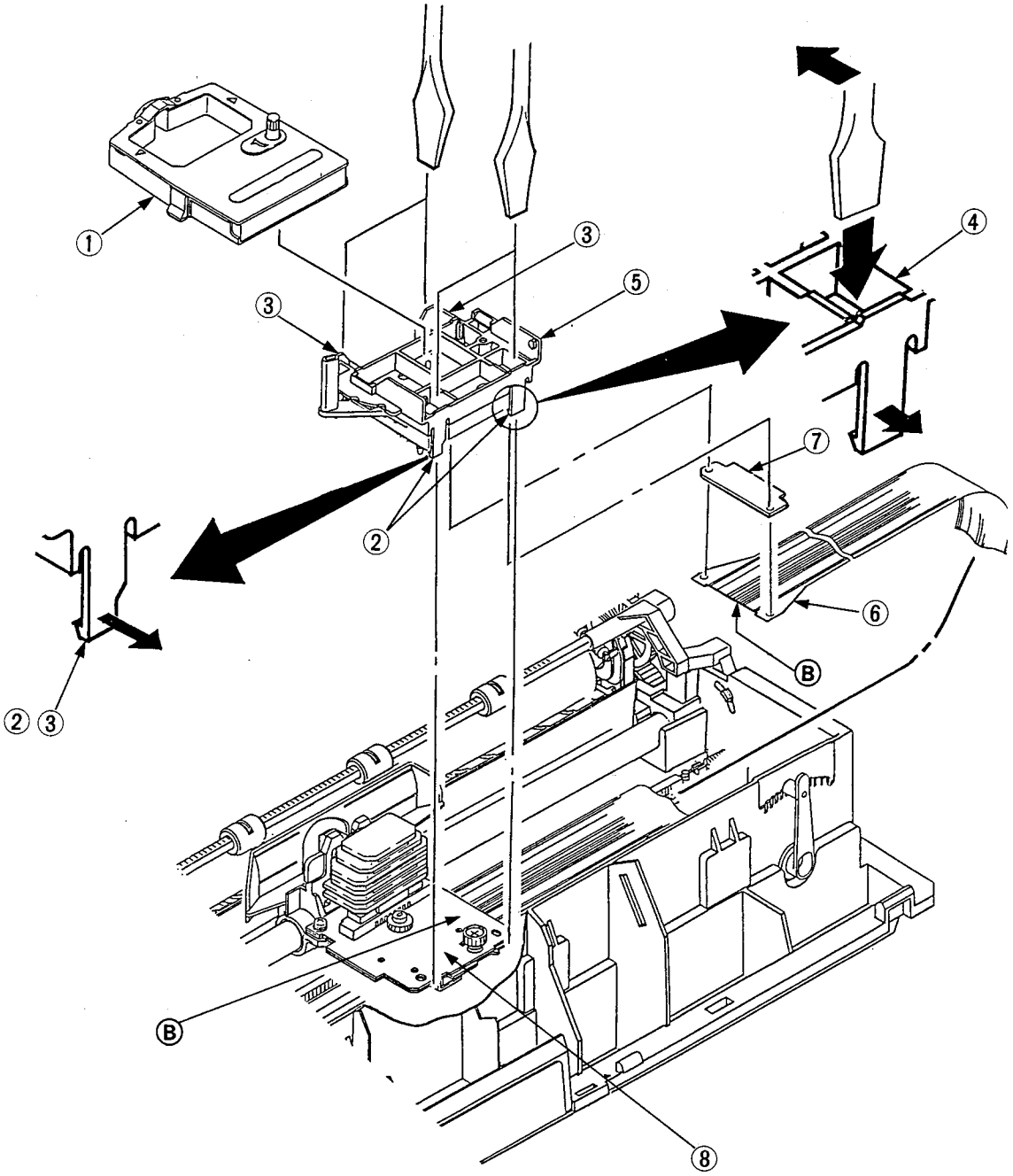
(3) Unlock two front claws ② and two rear claws ③ by pushing the claws outward with a flat-blade screwdriver inserted through the hole ④.

(4) Pull upwards and detach the ribbon feed gear assembly ⑤.

(5) Detach the head cable ⑥, and contact pressure rubber ⑦ from the drive assembly.

[Notes on installation]

1. *Do not touch the exposed terminals (crimp terminals) Ⓑ on the carriage cable ⑥ and space motor assembly ⑧. Protect these terminals from dirt and dust.*
2. *Do not bend the carriage cable ⑤ at acute angles, as damage could occur.*


1
3
3
5
4
7
2
6
2 3
B
B
8

4.3.15 Space motor assembly

(1) Detach the ribbon drive gear assembly. (See 4.3.14.)

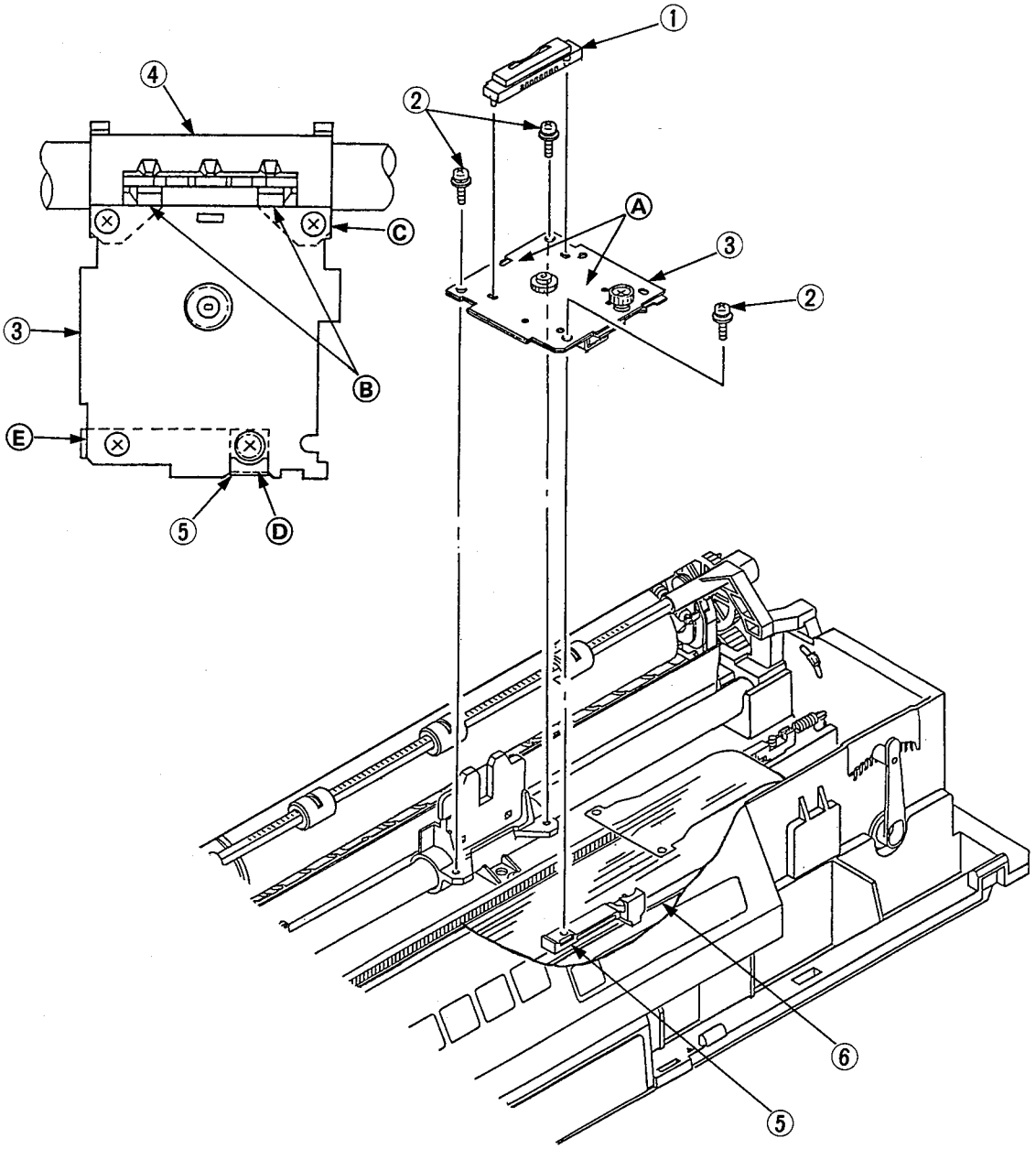
(2) Detach the connector ① by noting the direction of the notched side.

(3) Remove the three screws ②.

(4) Detach the space motor assembly ③.

[Notes on installation]

1. *Do not touch the exposed terminals (crimp terminals) Ⓐ on the space motor assembly ③. Protect these terminals from dirt and dust.*
2. *Install the space motor assembly ③ by fitting Ⓑ to the carriage frame ④ and aligning the surface Ⓒ with the corresponding carriage frame surface.*
3. *Install the slider ⑤ by fitting Ⓓ and Ⓔ to the space motor assembly ③. Make sure the slider is positioned under the lip of the guide rail ⑥.*
4. *After installing the ribbon drive gear and related assemblies, check and adjust the gap between the platen and printhead. (See 5.1.)*


1
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A
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C
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3
B
E
5
D
6
5

4.3.16 Carriage frame

(1) Detach the space motor assembly. (See 4.3.15.)

(2) Detach the head clamp ①.

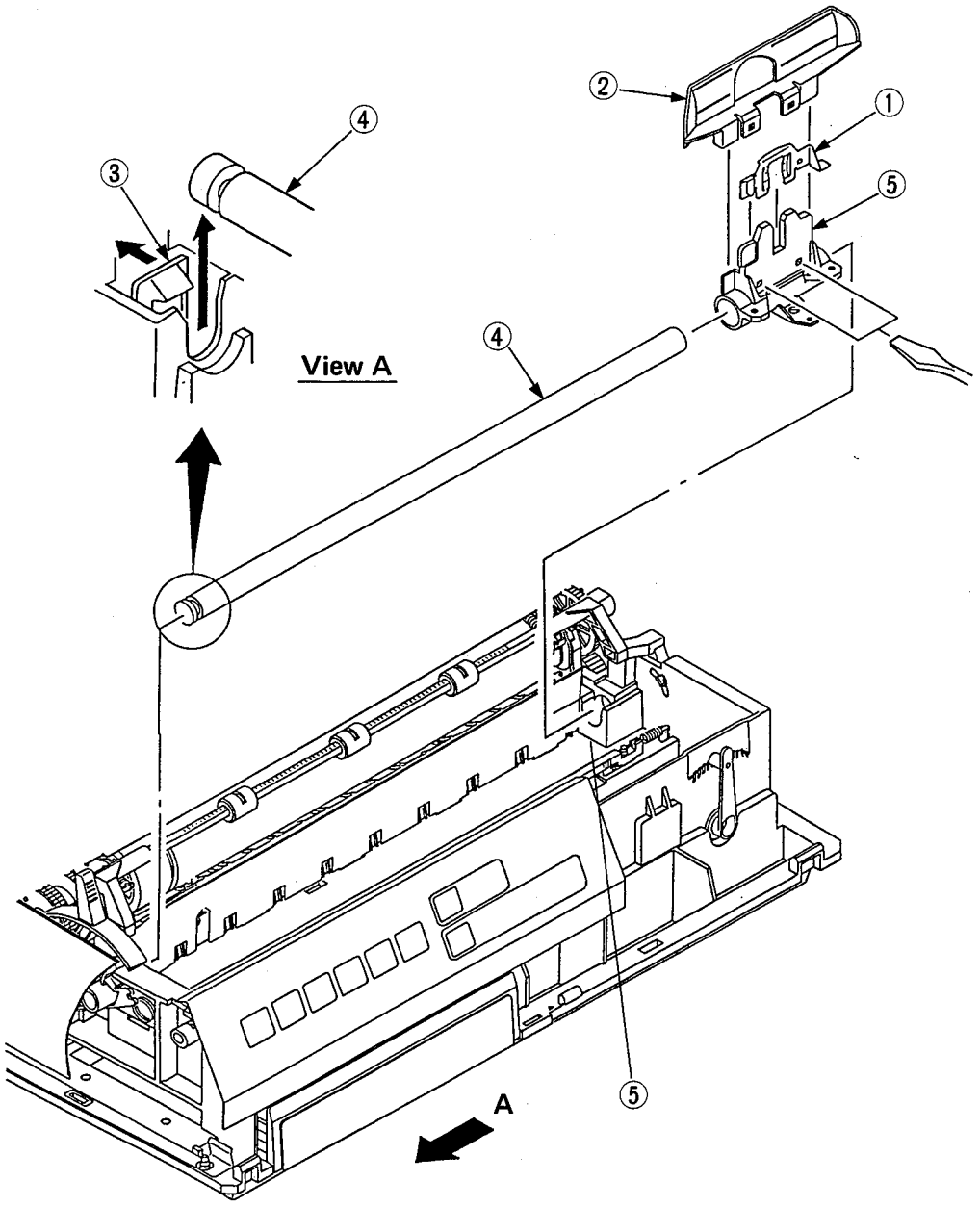
(3) Detach the ribbon protector ②.

(4) Push the shaft clamp ③ to the left on the left end of the main frame and lift the carriage shaft ④. Then, pull out the right end of the shaft from the guide hole, and detach the shaft together with the carriage frame ⑤.

(5) Pull out the carriage shaft ④ from the carriage frame ⑤.

[Note on installation]

After installing the carriage frame and related assemblies, adjust the gap between the platen and printhead. (See 5.1.)



4.3.17 Space rack

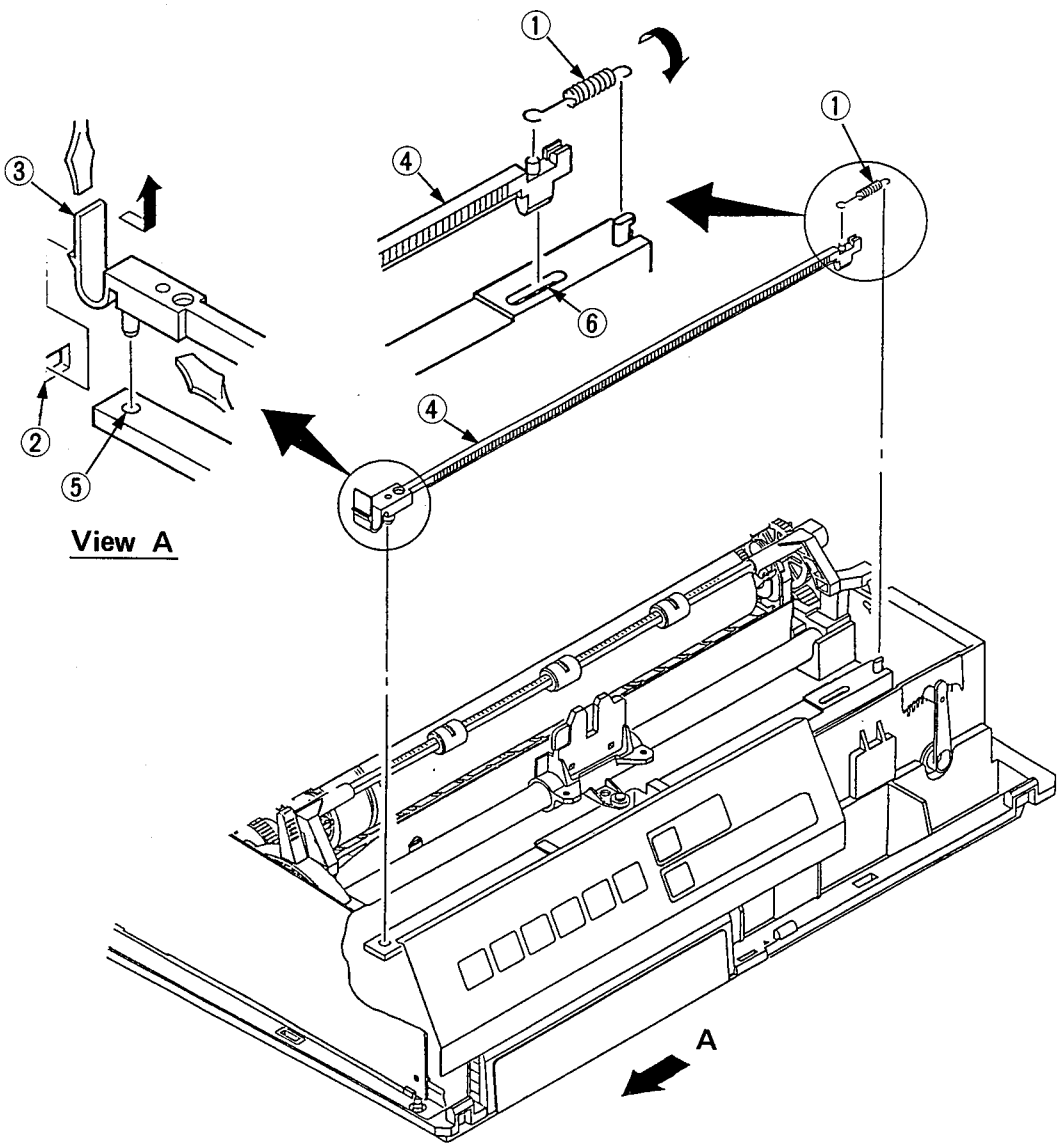
(1) Detach the space motor assembly. (See 4.3.15.)

(2) Detach the spring ①.

(3) Lift the space rack ④ while disengaging the claw ③ from the insertion hole ② in the main frame.

[Notes on installation]

1. *When installing the spring ①, twist its right end 90° counterclockwise.*
2. *Install the rack so that it connects the two guide holes ⑤ and ⑥.*
3. *After installing the space motor and related assemblies, check and adjust the gap between the platen and printhead assembly. (See 5.1.)*



4.3.18 Guide rail

(1) Detach the space motor assembly. (See 4.3.15.)

(2) Detach the adjust ring cam ① by the following steps.

(a) Pull the adjusting cam ① outward and turn it 90° clockwise to a horizontal position.

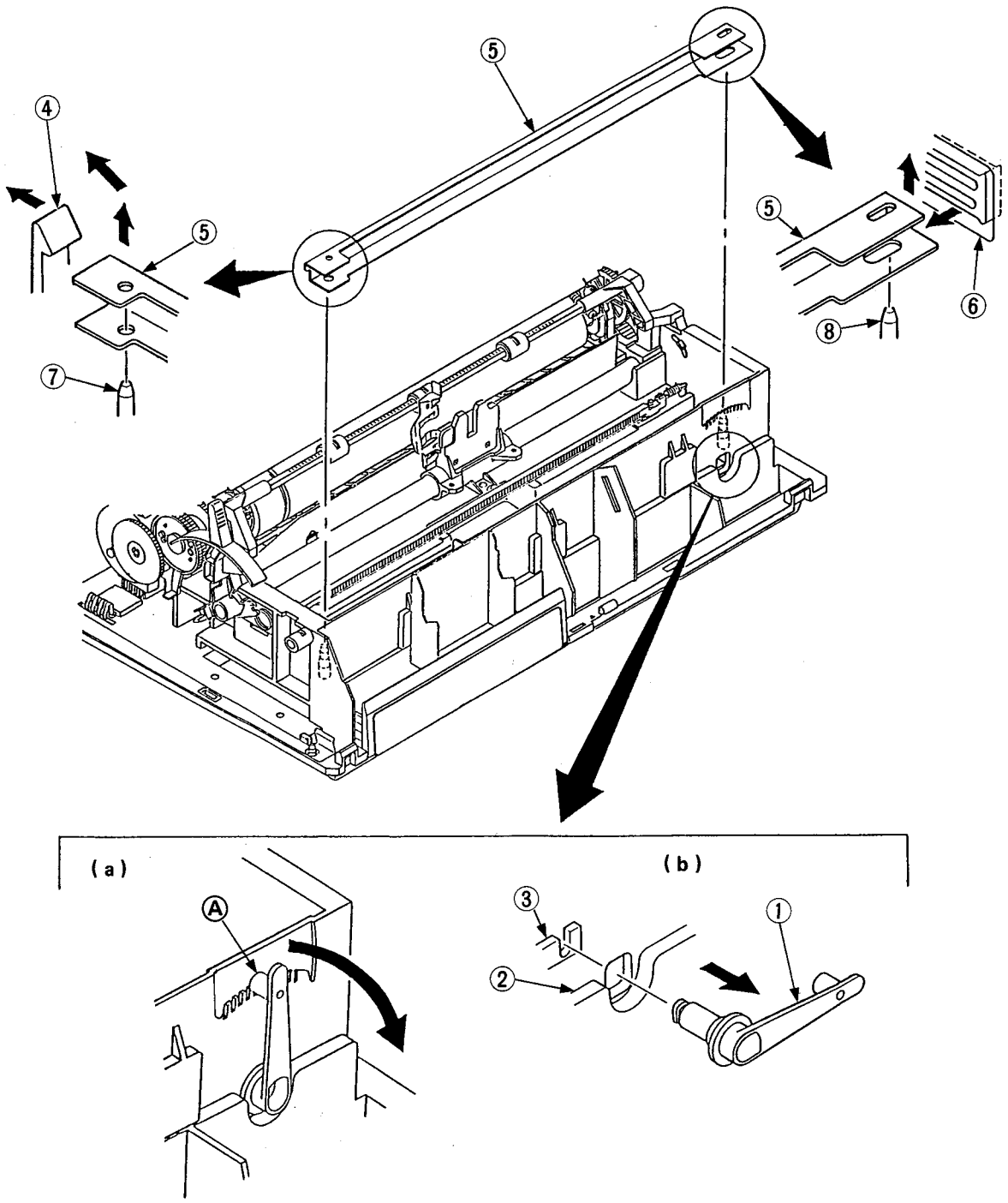
(b) Detach the cam by pulling it through the guide ③ in the main frame ②.

(3) Push the claw ④ outward and disengage it from the left end of the guide rail ⑤.

(4) Detach the right end of the guide rail ⑤ by pulling it out from the guide ⑥ in the main frame and lifting it.

[Notes on installation]

1. *Install the guide rail so that it connects the two guide points ⑦ and ⑧.*
2. *After installing the guide rail and related assemblies, adjust the gap between the platen and printhead. (See 5.1.)*


④
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⑦
⑧
(a)
(b)
Ⓐ
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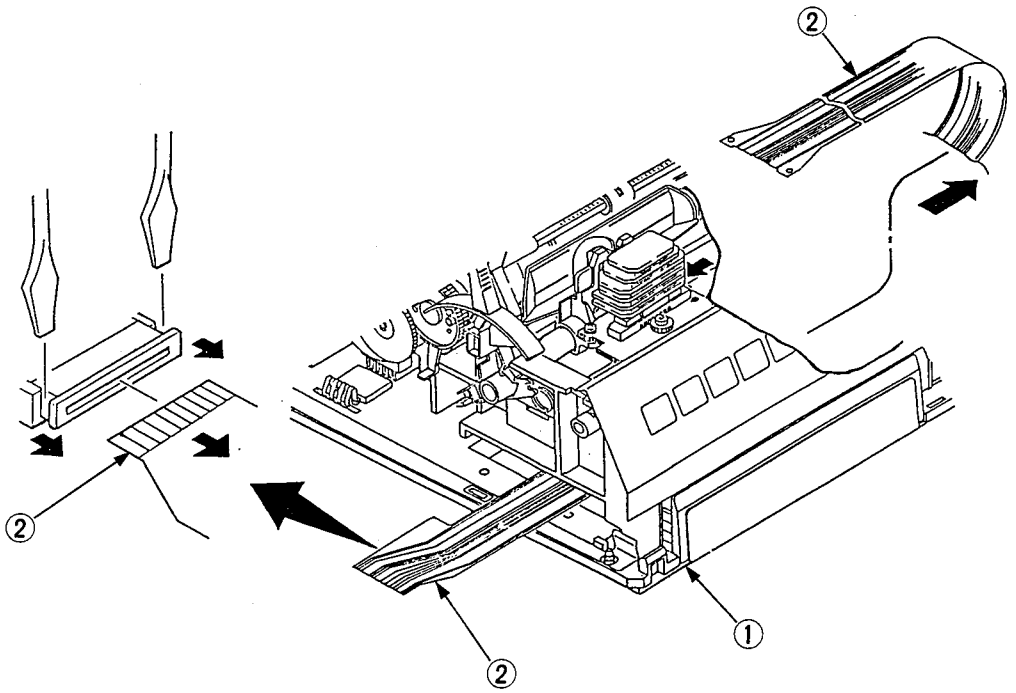
②
③

4.3.19 Head cable

(1) Detach the control board. (See 4.3.5.)

(2) Detach the ribbon drive gear assembly. (See 4.3.14.)

(3) Move the carriage to the left end ①, and detach the head cable ② by pulling it.



4.3.20 Platen assembly

(1) Detach the upper cover assembly. (See 4.3.3 (3).)

(2) Detach the ruler guide ① by tilting it backward.

(3) Move the bail arm toward the front of the printer.

(4) Push the release lever to its rear position.

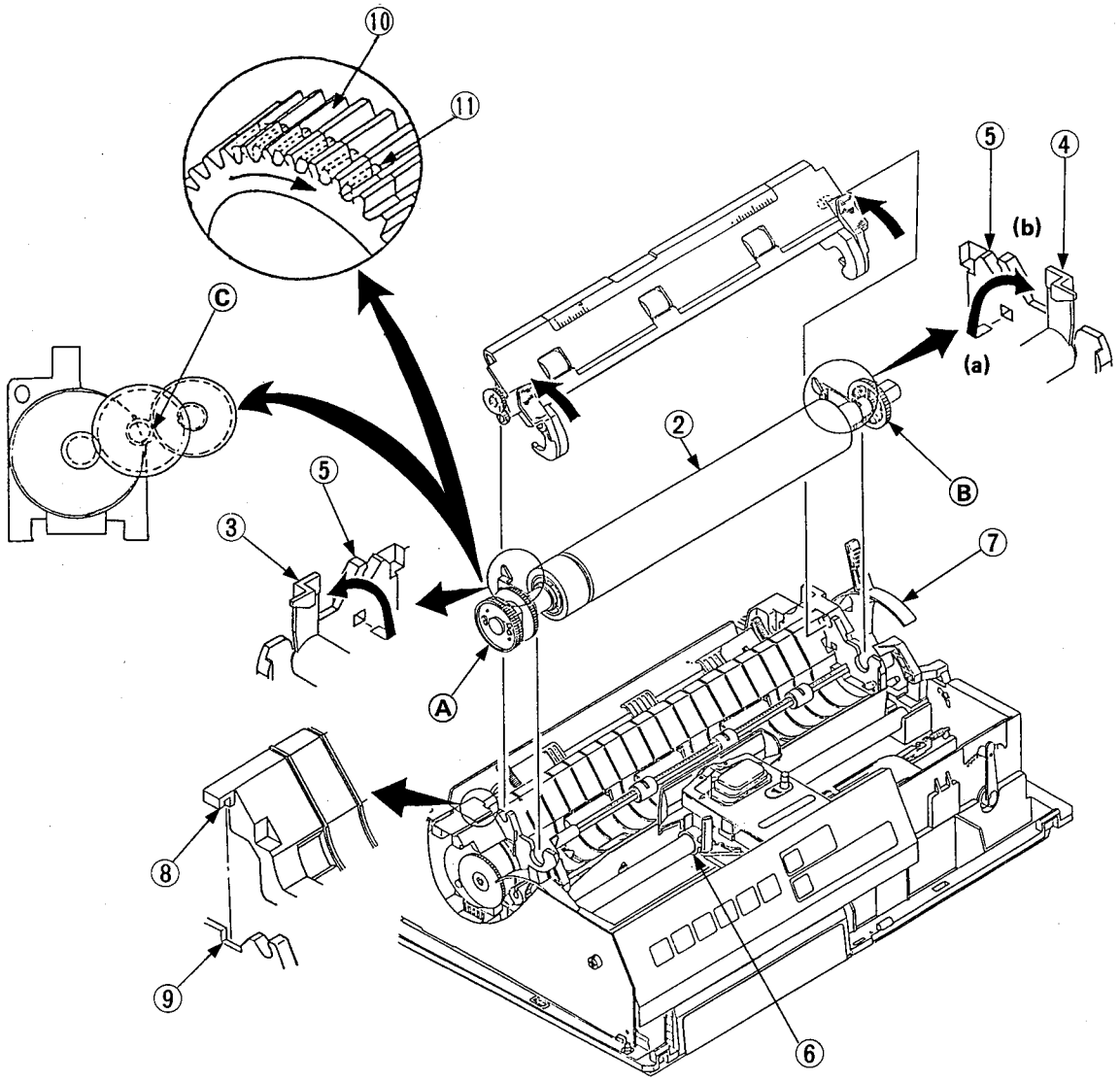
(5) Pull the lock levers ③ and ④ in the direction of the arrow (a) and move them 90° upward (arrow (b)). This releases the platen assembly ② from the main frame ⑤.

(6) Move the carriage frame ⑥ to the right end, lift the left end of the platen assembly ②, and return the frame to the left end.

(7) Detach the platen assembly ② from the main frame by lifting its right end.

[Notes on installation]

1. *When mounting the platen assembly, teeth of the platen gear ⑩ and bias gear ⑪ must be aranged in the same position and mesh the teeth Ⓐ of LF motor gear. (Since there is a discrepancy of approx. quarter picth between the bias gear and the platen gear, be carefull for remounting two teeth of both gears in the same position.)*
2. *After installing the platen assembly, check that the gears engage securely at Ⓐand Ⓑ, and the platen turns smoothly.*
3. *Lock the platen assembly after setting the release lever ⑦ to the open (forward) position, and confirming that the paper chute positioning hole ⑧ is properly engaged in the main frame groove ⑨.*



4.3.21 Ribbon protector

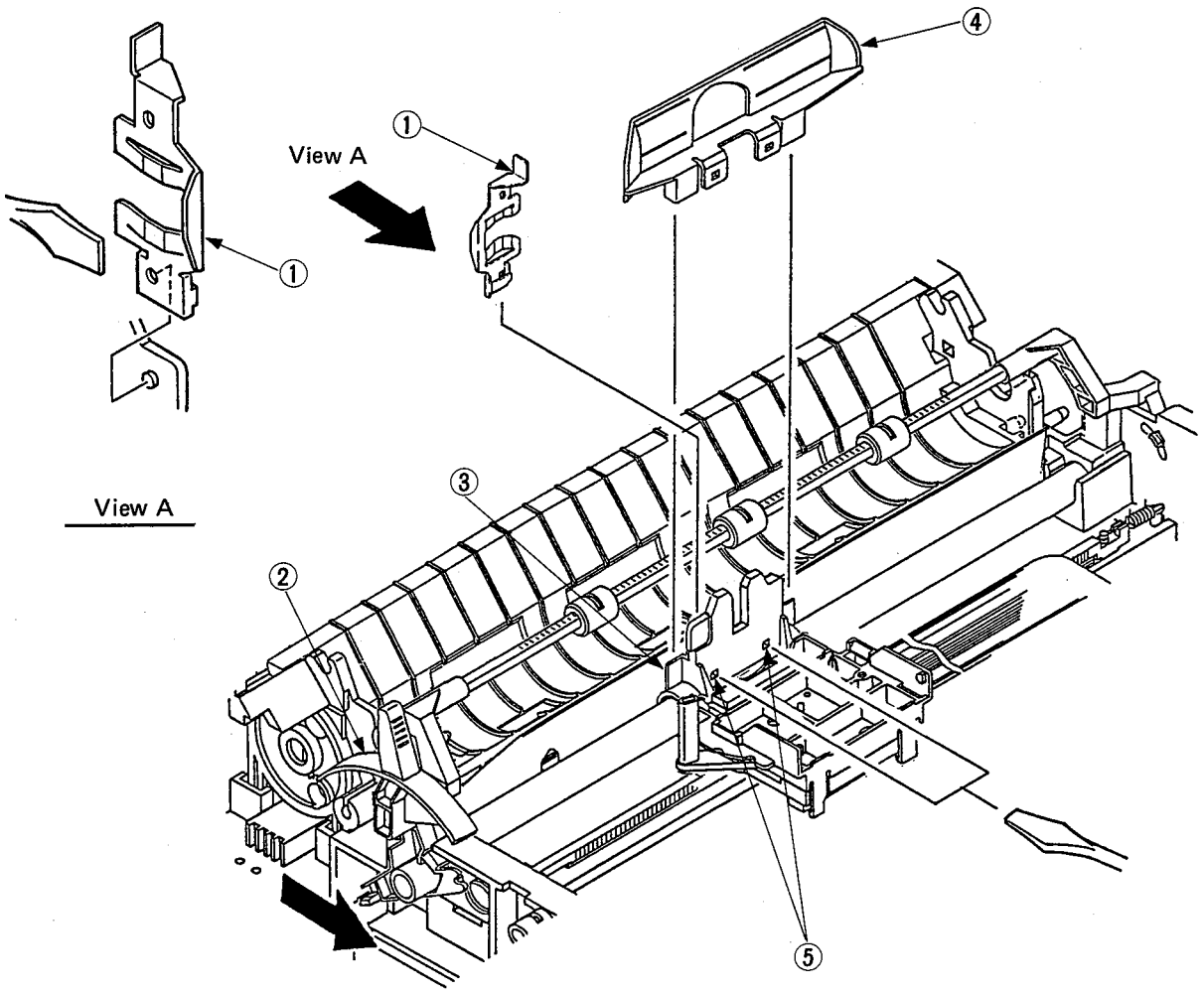
(1) Detach the printhead. (See 4.3.2.)

(2) Detach the platen assembly. (See 4.3.20.)

(3) Push the supporting point Ⓐ outward to detach the head clamp ①.

(4) Pull the bail lever ② towards the front of the printer.

(5) Detach the ribbon protector ④ from the carriage frame ③ by unlocking it with a flat-blade screwdriver through a slot ⑤ in the frame.



4.3.22 LF motor

(1) Detach the control board. (See 4.3.5.)

(2) Detach the platen assembly. (See 4.3.20.)

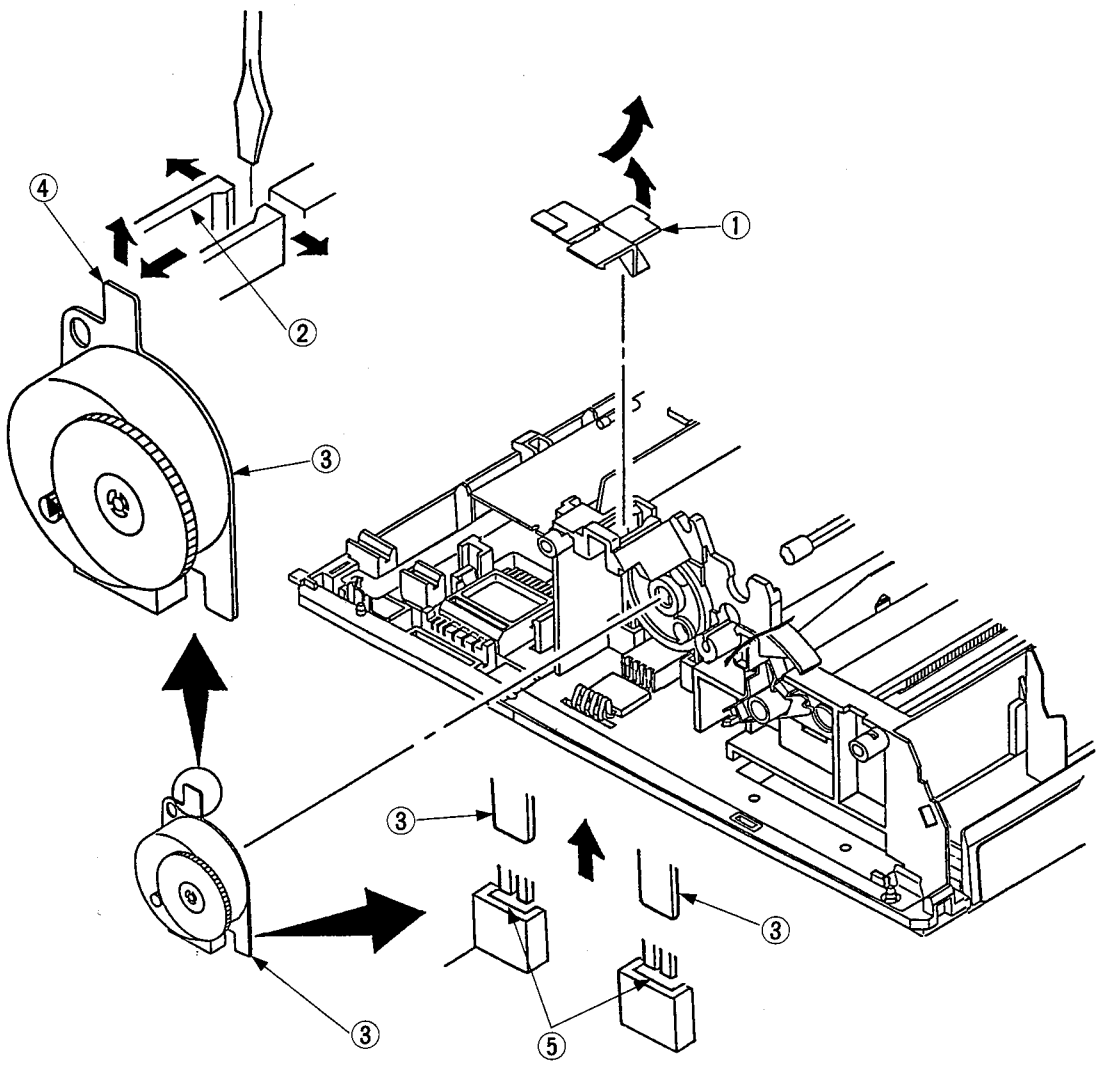
(3) Detach the board lock ①.

(4) Open the lock lever ② and push the bracket ④ of the LF motor ③ outward to the left.

(5) Detach the LF motor ③ from the guide hole ⑤ below.

[Note on installation]

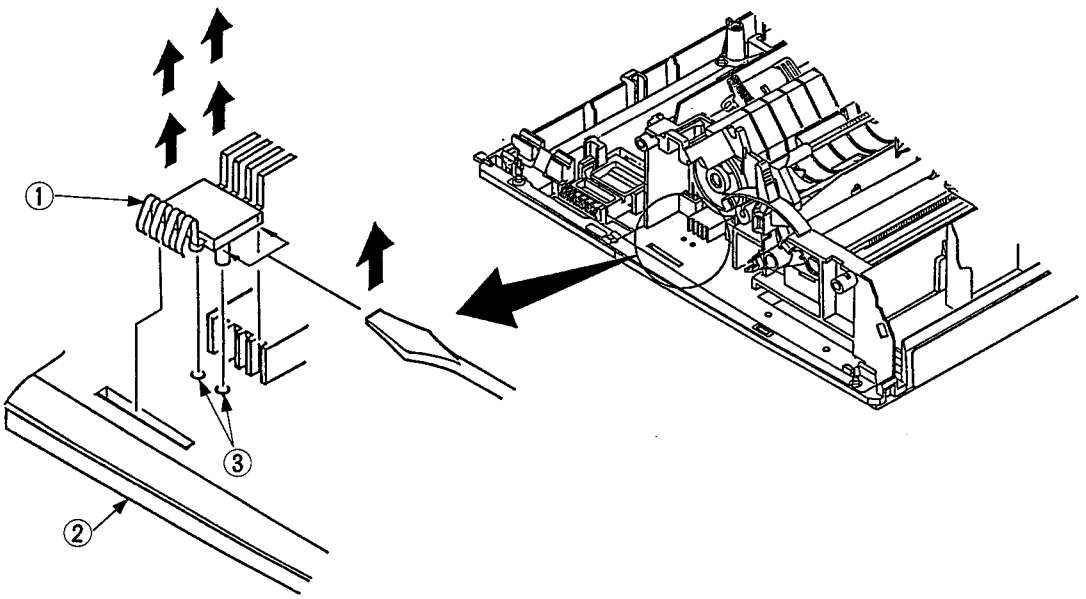
After installing the LF motor, check that the right and left gears of the platen engage securely, and the platen turns smoothly.



4.3.23 LF motor interconnect module

(1) Detach the LF motor. (See 4.3.22.)

(2) Insert a flat-blade screwdriver between the L.F. motor interconnect module ① and main frame ②, and detach the module ① from the two insertion holes ③.



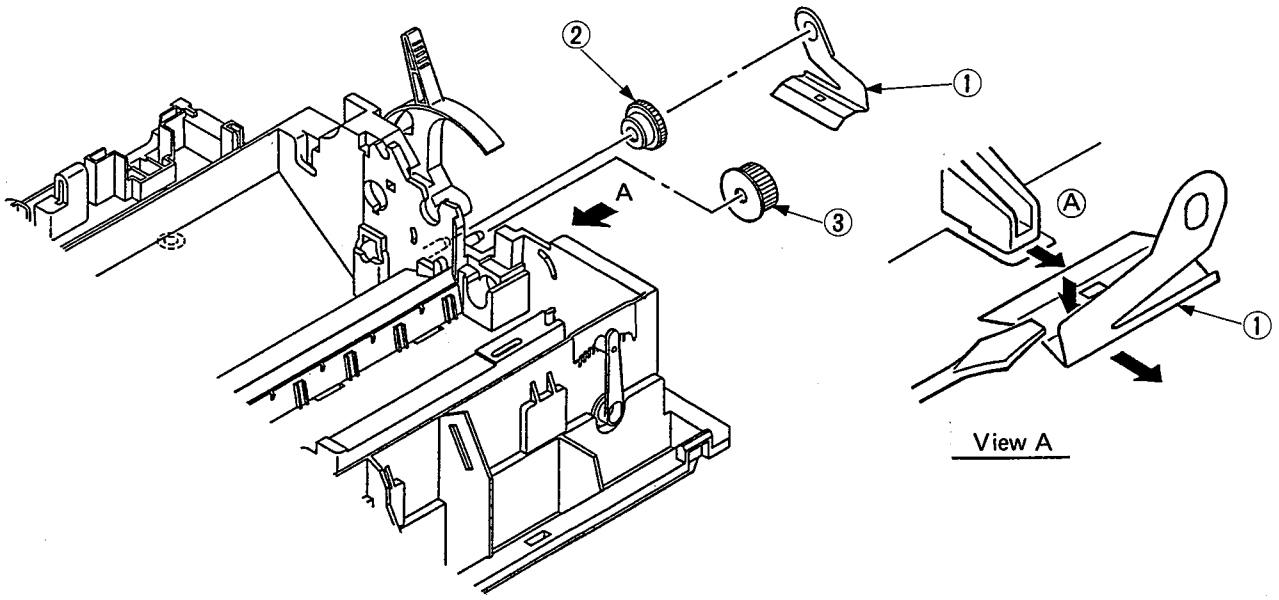
4.3.24 Idler gear

(1) Detach the platen assembly. (See 4.3.20.)

(2) Detach the reset spring ① as follows:

Push the reset spring ① at the top center downward with a flat-blade screwdriver, and pull the spring in the direction of the arrow Ⓐ to remove it.

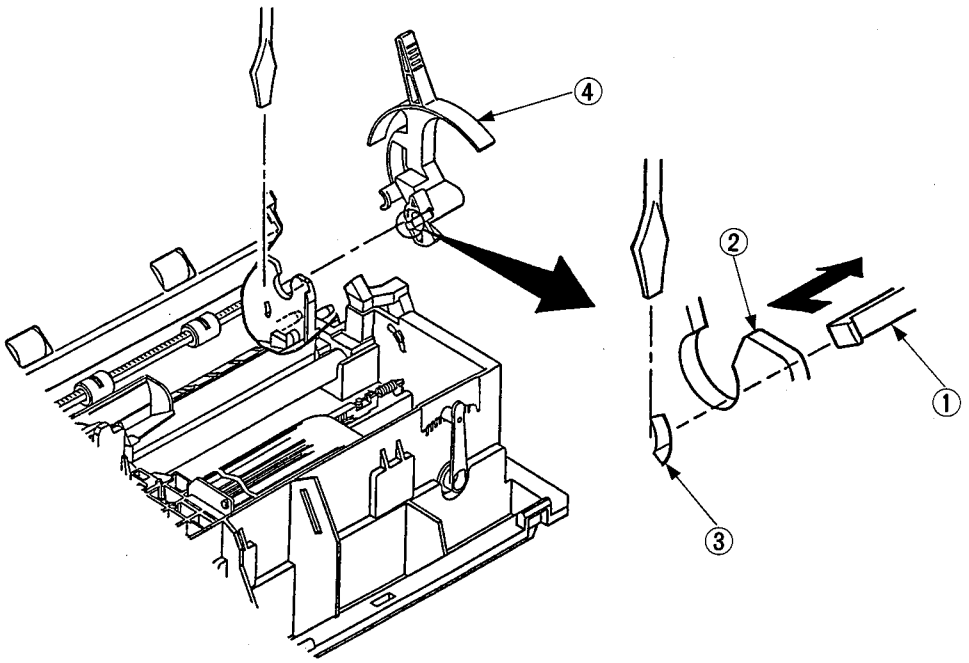
(3) Detach the change gear ② and idler gear ③.



4.3.25 Release lever

(1) Detach the change gear. (See 4.3.24 (3).)

(2) Detach the claw ① from the guide ③ in the main frame ②, and turn the release lever ④ forward. Pull outward to the right to remove from the main frame.



4.3.26 Pressure roller assembly

(1) Detach the platen assembly. (See 4.3.20.)

(2) Take out the paper chute ①.

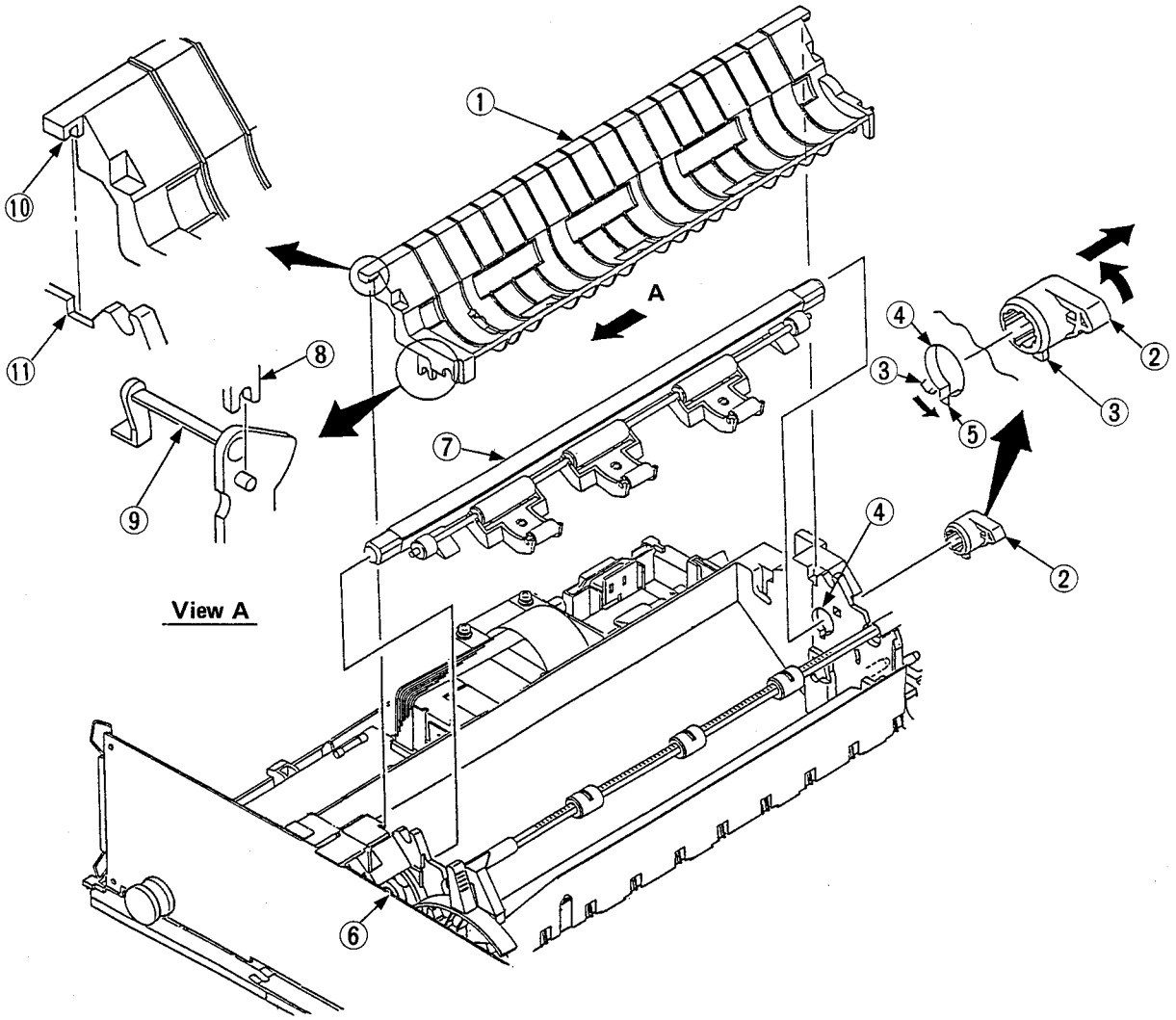
(3) Detach the release lever. (See 4.3.25.)

(4) Turn the release link ② clockwise as viewed from View A as far as it goes. Then, detach the release link ② by detaching the claw ③ from the slot ⑤ in the guide hole ④ in the main frame.

(5) Detach the pressure assembly ⑦ by sliding it out through the guide holes ④ and ⑥.

[Notes on installation]

1. *Attach the paper end lever ⑧ on the paper chute to the shaft of the sensor lever ⑨.*
2. *Lock the platen assembly after setting the release lever to the open (forward) position, and confirming that the paper chute positioning hole ⑩ is properly engaged in the main frame groove* 11 .



4.3.27 Tractor assembly

(1) Detach the tractor gear ① as follows:

Push the claw ② of the tractor gear ① outward and detach it from the groove ④ in the drive shaft ③. Then, detach the gear to the right and remove.

(2) Detach the pressure roller assembly. (See 4.3.26.)

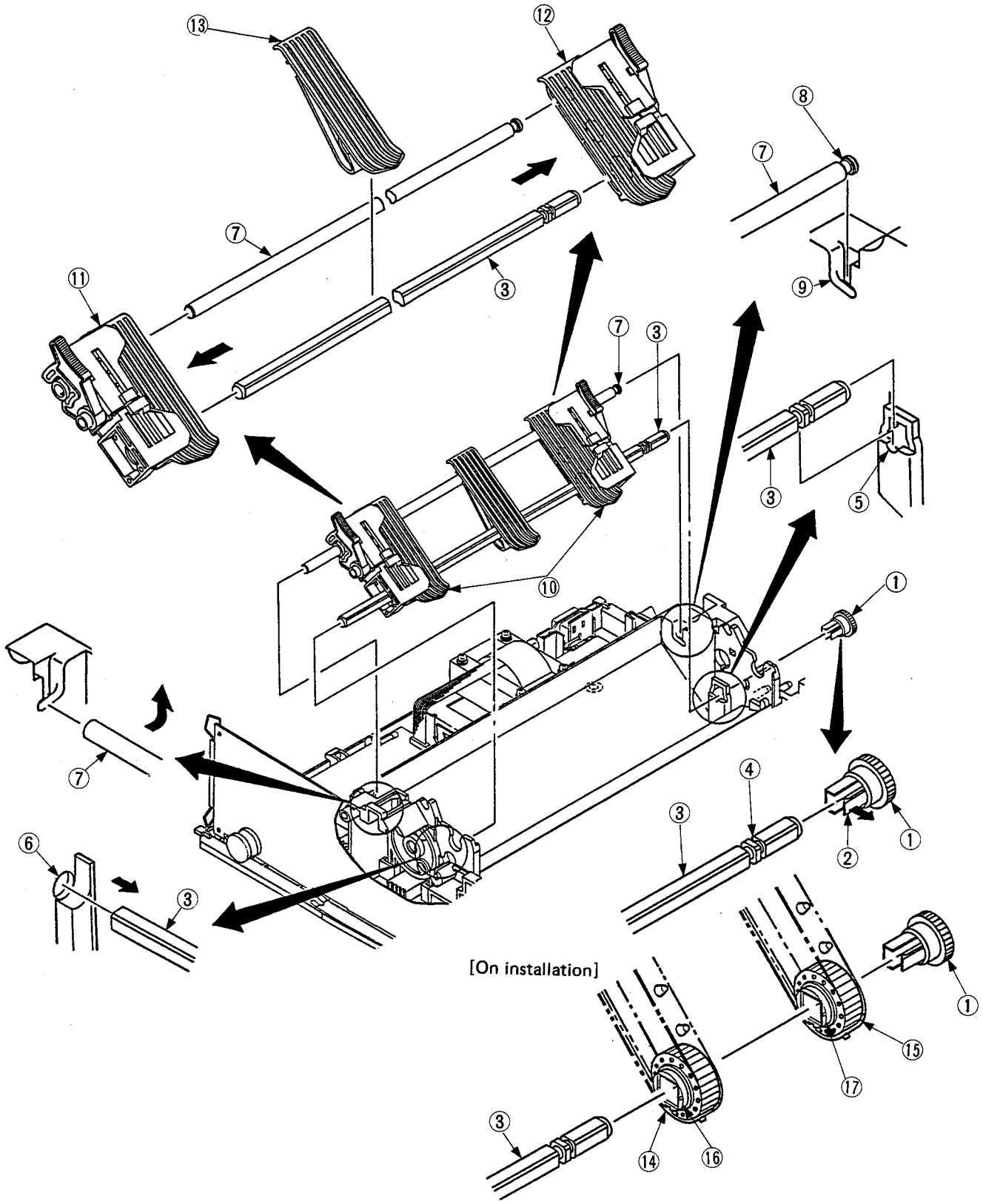
(3) Lift the drive shaft ③ above the guide ⑤ and slide it to the right until its left end is exposed from the guide hole ⑥.

(4) Detach the tractor assembly ⑩ by detaching the slot ⑧ in the lock shaft ⑦ from the guide ⑨ and the drive shaft ③ from the right guide ⑤.

(5) Detach the tractor frame (L) ⑪, tractor frame (R) ⑫, and sheet guide ⑬ from the two shafts.

[Note on installation]

Adjust the projections ⑯ and ⑰ of the pin tractor wheel ⑭ and ⑮ on the tractor frame (L) and (R) so that the projections face the same direction. Then mount the frame on the drive shaft ③.


[On installation]

4.3.28 Sensor lever

(1) Detach the LF motor. (See 4.3.22.)

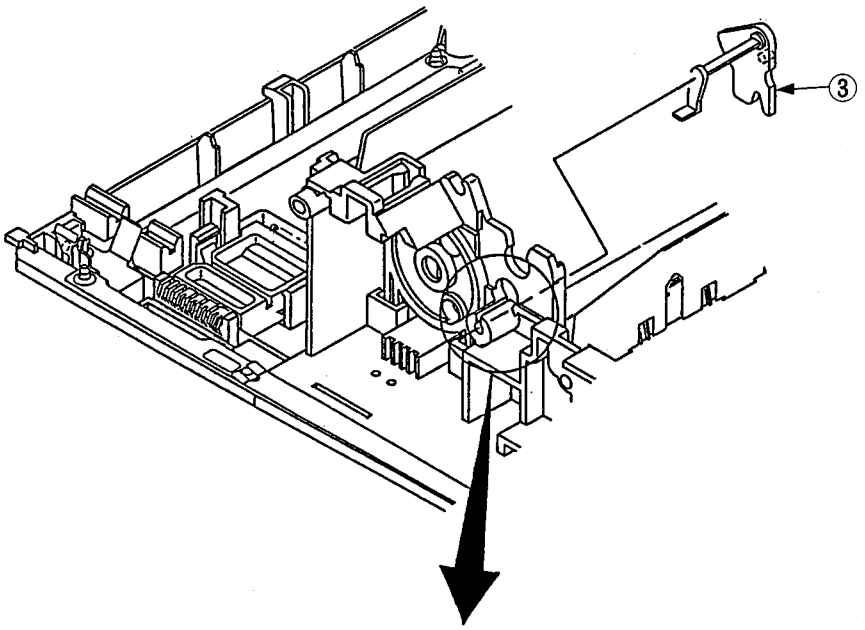
(2) Detach the tractor assembly. (See 4.3.27.)

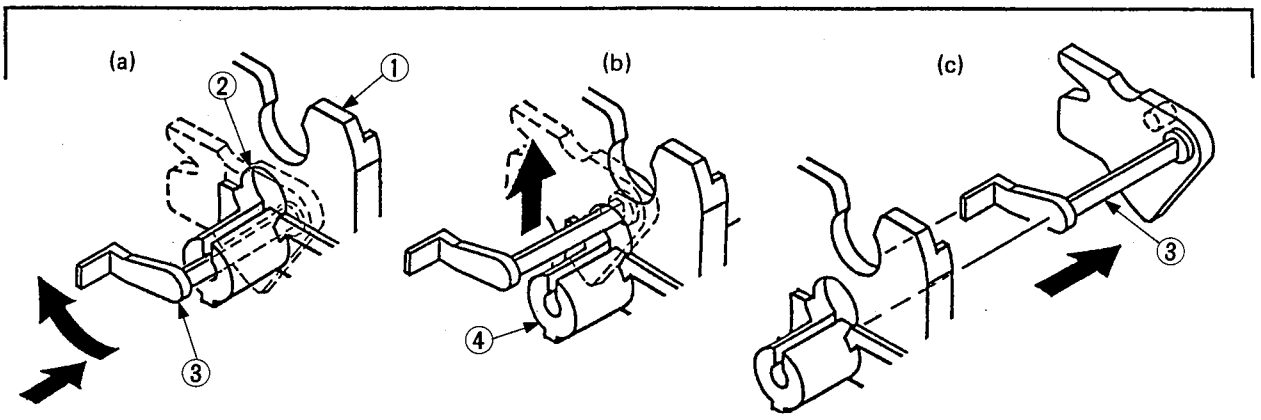
(3) Detach the sensor lever ③ from the guide hole ② in the main frame as follows:

(a) Turn the sensor lever ③ 90° clockwise.

(b) Detach the sensor lever ③ by moving it upward from the shaft support ④.

(c) Pull out the sensor lever from the guide hole ② in the main frame ①.



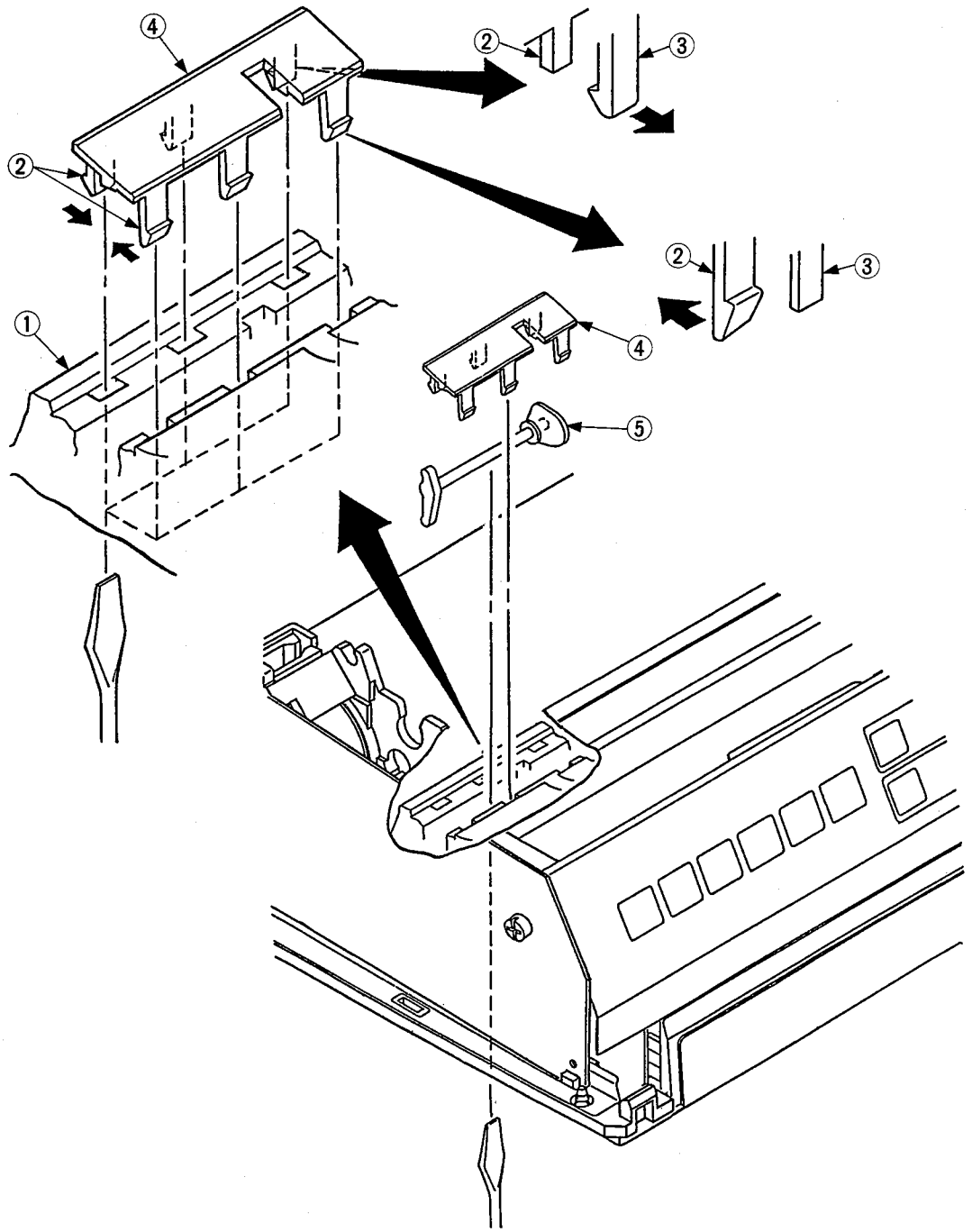


4.3.29 Paper end lever

(1) Detach the tractor assembly. (See 4.3.27.)

(2) Detach the six claws ② from the bottom side of the main frame ① with a flat-blade screwdriver.

(3) Then, detach the sensor cover ④ by pulling it upwards.



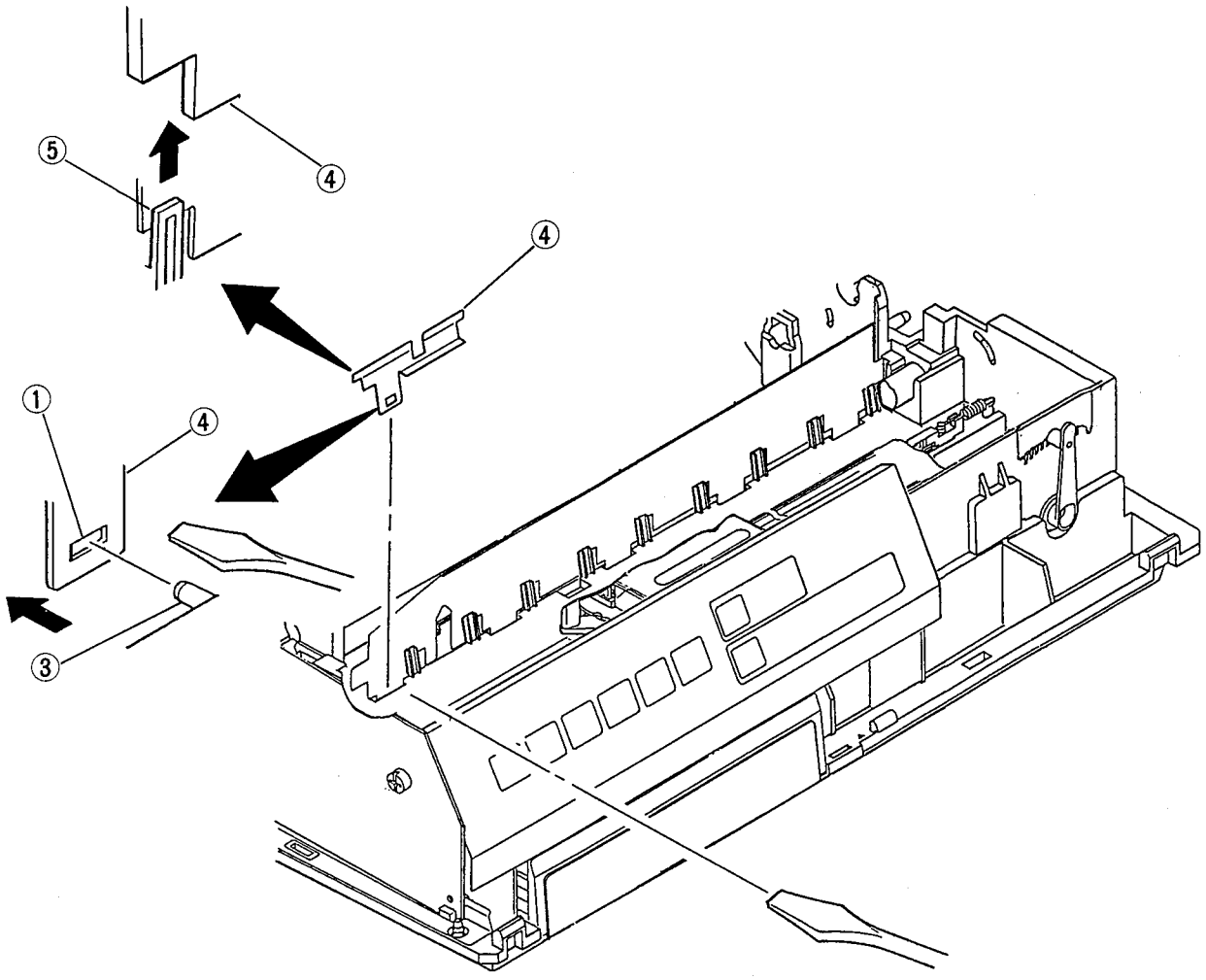
4.3.30 Support spring (In case of ML321)

(1) Detach the platen assembly. (See 4.3.20.)

(2) Detach the coupling holes ① from the projections ③ on the main frame ② with a flat-blade screwdriver in order to detach the support spring ④.

[Note on installation]

Install the support spring so that it is fitted into the projections ③ and guide plates ⑤ simultaneously.



4.3.31 Leaf spring

(1) Detach the platen assembly. (See 4.3.20.)

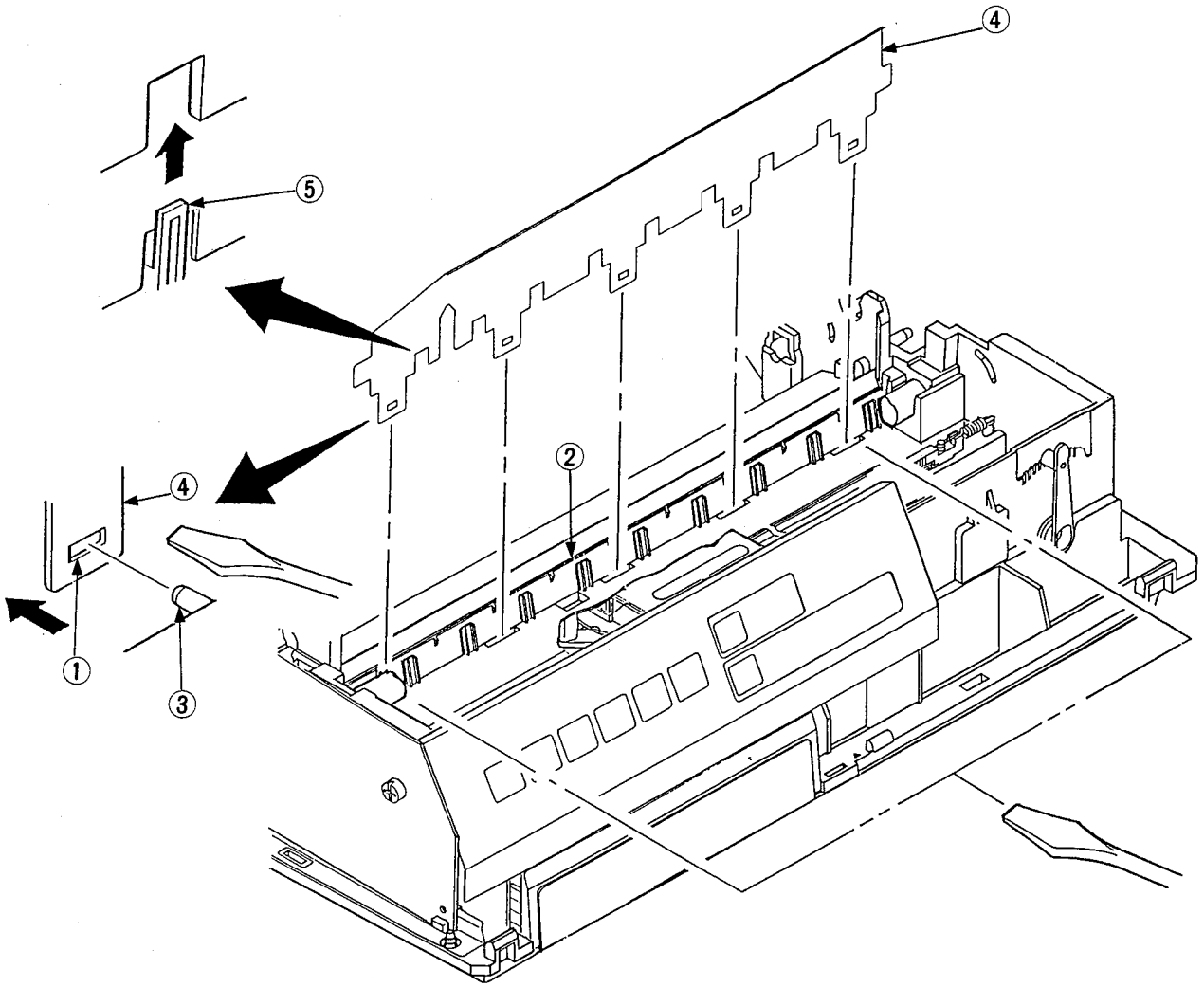
(2) In case of ML321, detach the support spring. (See 4.3.30.)

(3) Detach the coupling holes ① from the projections ③ on the main frame ② with a flat-blade screwdriver sequentially from left to right in order to detach the leaf spring ④.

[Note on installation]

Install the leaf spring so that it is fitted into the projections ③ and guide plates ⑤ simultaneously.

Coupling holes	:	ML320	5 points
		ML321	7 points
Guide plates	:	ML320	10 points
		ML321	13 points



5. ADJUSTMENT

5. ADJUSTMENT

5.1 Gap Between The Platen And Printhead

(1) Adjustment value : 0.018 ± 0.002 inch (0.45 ± 0.05 mm)

(2) Adjustment position : Perform at the left, center and right end of the platen.

(3) Adjustment method

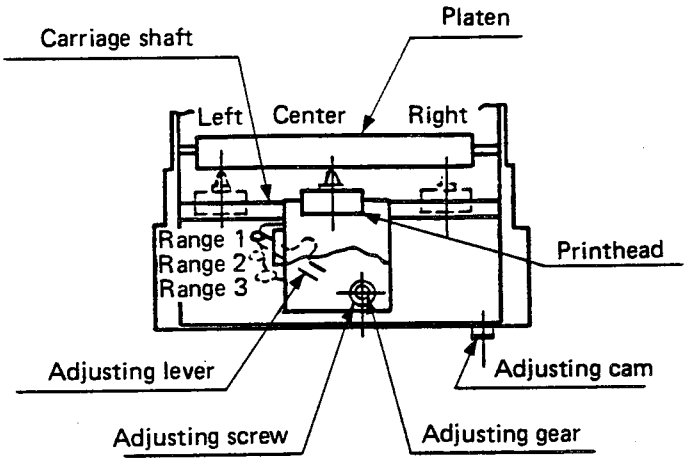
a) Push down the release lever to open.

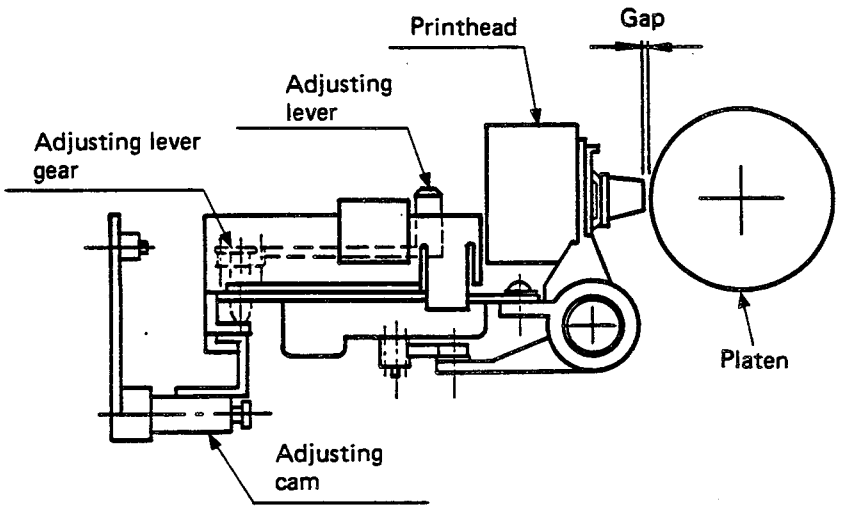
b) Set the adjusting lever to the range 1 position, press the adjusting gear to the downward (A) direction, and release the engaged adjusting lever and adjusting gear.

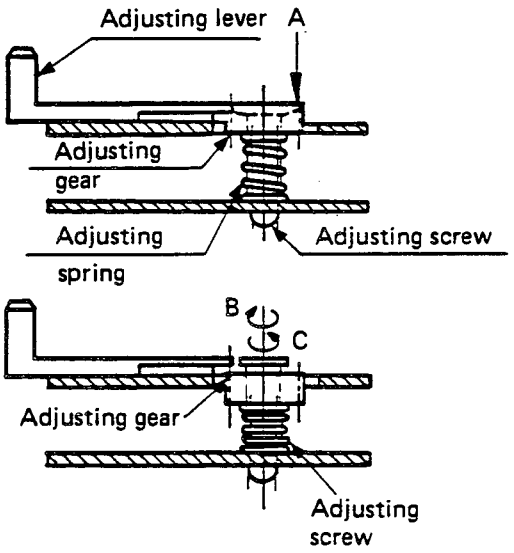
c) Adjust by turning the adjusting screw to the B or C direction.

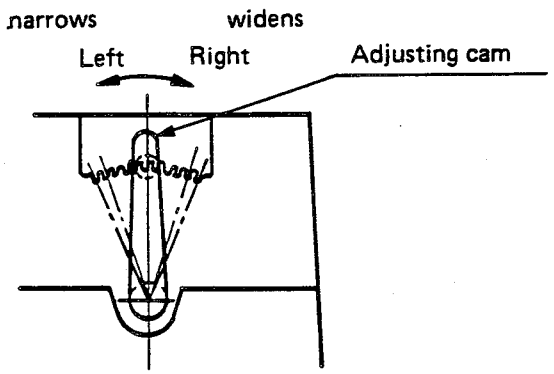
d) For the difference in gap between the right and left sides of the platen, turn the adjusting cam clockwise or counterclockwise to finalize the adjust.

e) Make sure that the gap is 0.028 ± 0.002 inch (0.71 ± 0.05 mm) with the adjusting lever at range 3.


Carriage shaft
Platen
Left
Center
Right
Range 1
Range 2
Range 3
Printhead
Adjusting lever
Adjusting cam
Adjusting screw
Adjusting gear


Printhead
Gap
Adjusting lever
Adjusting lever gear
Platen
Adjusting cam


Adjusting lever
A
Adjusting gear
Adjusting spring
Adjusting screw
B
C
Adjusting gear
Adjusting screw


narrows
widens
Left
Right
Adjusting cam

6. CLEANING AND LUBRICATION

6. CLEANING AND LUBRICATION

6.1 Cleaning

[Note] Perform cleaning after turning off the POWER switch.

Clean the inside of the printer periodically according to the following items.

Cleaning period : Every 6 months of operation or 300 hours, whichever comes first.

Required time : About 10 min.

Tools to be used : Dry soft cloth (such as gauze, etc.) (A vacuum cleaner is preferable.)

Cleaning area : As in Table 6-1.

Table 6-1 Areas to be cleaned

Area to be cleaned	Contents of cleaning
Carriage shaft and its vicinity	Remove the paper dust and wipe off dirt, dust, ribbon waste, etc.
Paper line feed surface	Clean the pin rollers and the platen with a cleaning liquid.
Paper end sensor	Wipe off the dust stuck to the sensors.

6.2 Lubrication

(1) Lubricant

1) Alvania grease #2EP (or equivalent) ····· GEP

2) Pan motor oil (or equivalent) ····· PM

(2) Amount of lubricant

1) ordinary ····· Ⓐ : About 3 to 4 drops oil or 0.008 inch (0.2 mm) thick grease.

2) small amount ··· Ⓑ : About one drop of oil.

(3) Period of lubrication

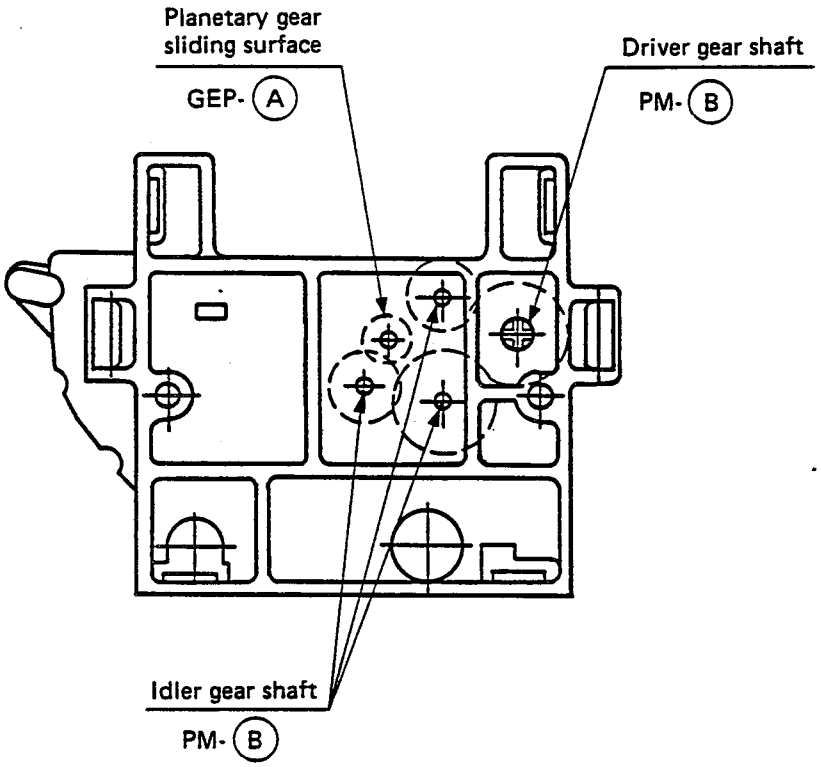
This equipment is designed to be maintenance-free and oiling is unnecessary while in operation. However, when reassembling or cleaning of oiled parts is performed, lubricant is required.

(4) Areas not to lubricate.

Item No.	Inhibit point	Reason	Remarks
1	Platen surface	To prevent stained paper	
2	Pressure roller surface	To prevent stained paper and poor feeding	The roller surface should be free of oil because grease is applied to the pivotal part of the pressure roller.
3	Pressure roller for bail bar	To prevent stained paper and bad feeding	
4	Ink ribbon	To prevent poor printing	
5	Pin tractor	To prevent stained paper	
6	Flexible cable	To prevent poor contact and cracked cables	
7	Motor board	To prevent poor contact	

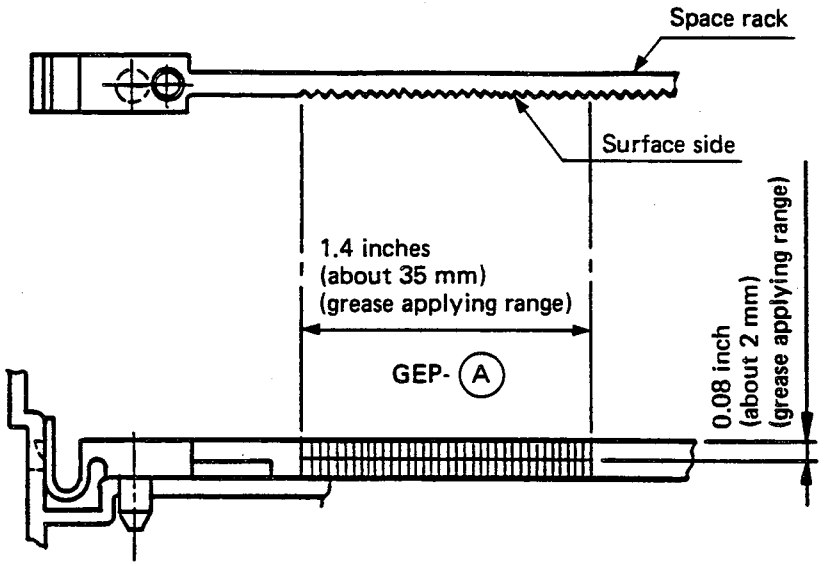
(5) Lubrication points

a) Ribbon drive gear assembly



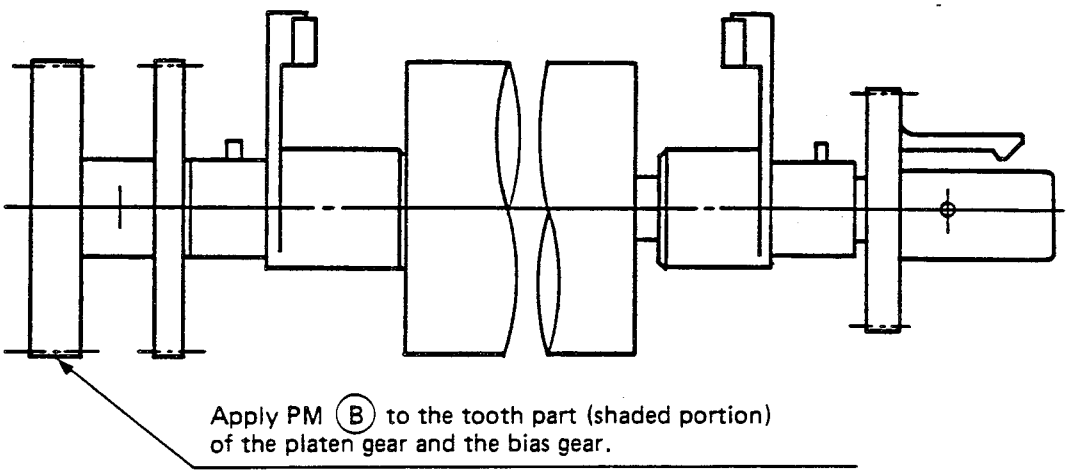
Note: The upper and lower part of the gear shaft should be oiled.

b) Space rack

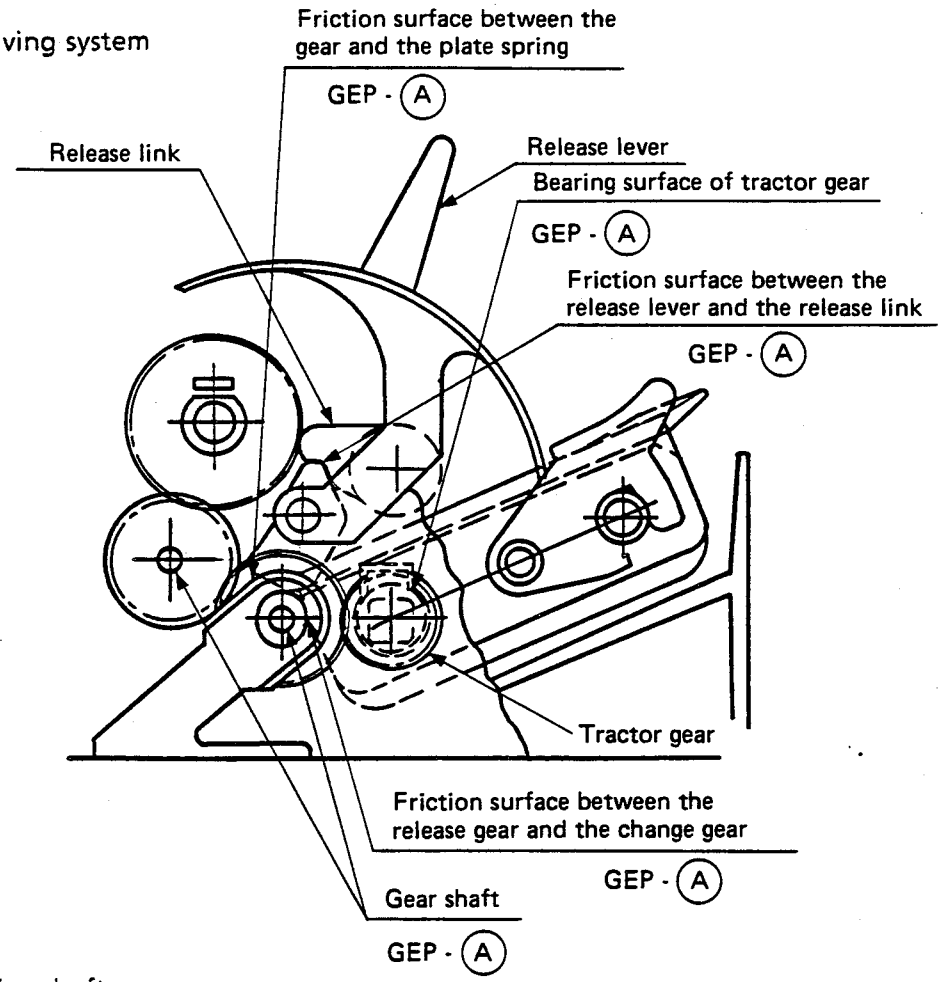


Note: *Grease should be applied about 1.4 inches (35 mm) from the left end of the tooth section and to the shaded section about 0.08 inch (2 mm) from the rack top surface side.*

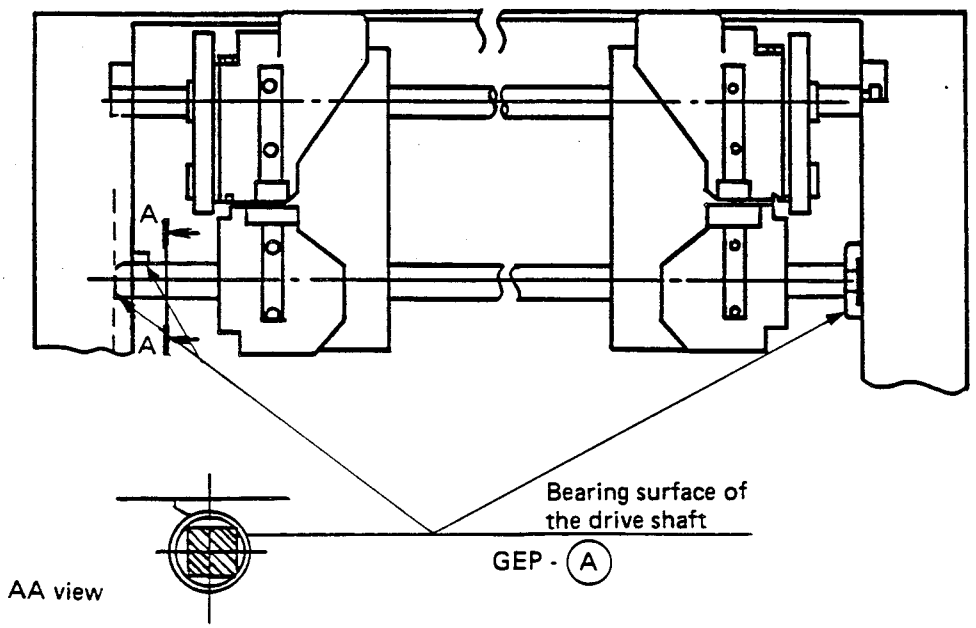
c) Platen assembly



d) Tractor driving system


Friction surface between the gear and the plate spring
GEP - (A)
Release link
Release lever
Bearing surface of tractor gear
GEP - (A)
Friction surface between the release lever and the release link
GEP - (A)
Tractor gear
Friction surface between the release gear and the change gear
GEP - (A)
Gear shaft
GEP - (A)

e) Tractor drive shaft



7. TROUBLESHOOTING AND REPAIR

7. TROUBLESHOOTING AND REPAIR

7.1 Items to be Checked before Repair

If repair is requested by a user, check whether the printer can be fixed by the troubleshooting procedure described in the User's Manual.

If possible, ask the user under what conditions the trouble occurred, and record the answer.

Before troubleshooting, let the printer operate under the same conditions as when the trouble occurred and check whether the trouble is reproducible. If not, perform test printing and then proceed to troubleshooting.

7.2 Method of Troubleshooting

First verify the trouble condition, then locate the trouble in accordance with the detailed procedure given for each item in Table 7-1.

Before remedying the trouble, thoroughly read the precautions in Section 4.1.

The checkpoints for LXMC board and LXSP-2 board are shown in Figure 7-1, 7-2 and the connector locations and pin numbers are shown in Figure 7-3.

Table 7-1

Status	Details	Flowchart item No.
Trouble upon power-on	• Power is not supplied.	①
	• Spacing operation does not operate normally.	②
Trouble during printing	• Wrong character, character omission or dot omission	③
	• Line feed trouble	④
	• Malfunction of switch on operator panel	⑤
	• Data receiving failure	⑥

7.3 Lamp Display

(1) Printer mode display

Table 7-2

Printer mode		ALARM	SELECT	Contents	Remarks
Normal operation mode	ON LINE	OFF	ON	Indicates that the printer is ready to receive data and print.	
	HEX DUMP			Indicates that the printer is in hex dump mode.	
	LOCAL	OFF	OFF	Indicates that the printer is in the local mode.	
	MENU		OFF	Indicates that the printer is in the menu mode.	
Operator alarm	Paper end	ON	OFF	Form end, single sheet end, or bottom paper end	
	Paper jam			SASF paper jam	
	CSF paper jam			Paper jam or paper end, when CSF is installed	
	Print suppress	OFF	BLINK	Indicates that the printer is in the print suppress mode.	
fault alarm		BLINK	OFF		

(2) Fault alarm display

When the printer detects a variety of alarm states, these alarm states are displayed using LEDs. Status displays for alarms are differentiated by MODE LEDs which are lit when the POW LED goes on and the ALM LED blinks.

The details are listed below.

Table 7-3 Alarm / Error Indications

Alarm	Severity	LEDs								Comment
		Primary Message			Detail Message					
		Menu	ALARM	SEL	10 CPI	12 CPI	17 CPI	20 CPI	PROP	
Paper Out	alarm	current mode	on	off	current CPI					alarm occurs 1" from bottom edge
Printhead Temp	alarm	blink	off	on	current CPI					after cool down, continues to print
MPU	fatal	off	blink	off	on	–	–	–	–	MPU internal RAM error
ROM	fatal	off	blink	off	–	on	–	–	–	Program ROM error
RAM	fatal	off	blink	off	–	–	on	–	–	RAM error
Spacing Motor	fatal	off	blink	off	–	–	–	on	–	Spacing error
Serial I/F	fatal	off	blink	off	–	–	–	–	on	Serial I/F board error

Note: *Blink = 400 ms ON, 400 ms OFF (50% duty cycle)*

LXMC-Printed-Circuit Board

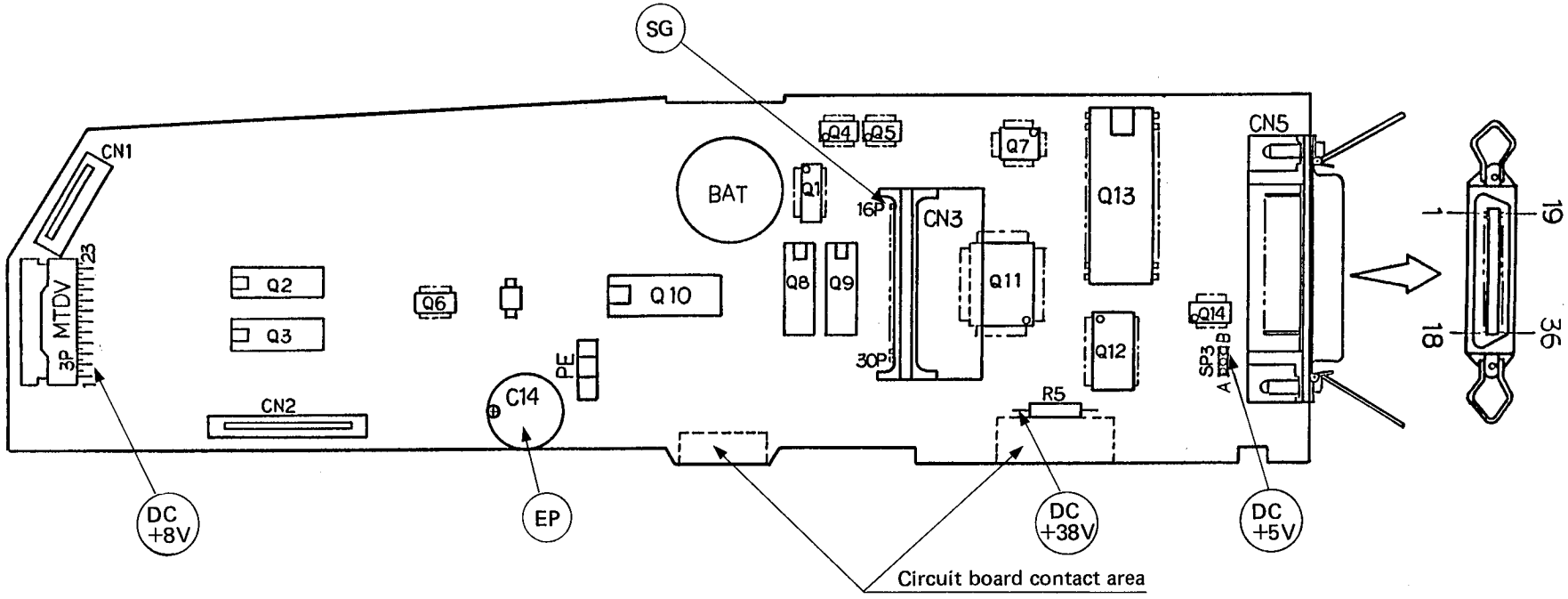


Figure 7-1 Checkpoints of printed circuit board (PCB version Nos. 2 to 7)

LXSP-2 Printed Circuit Board

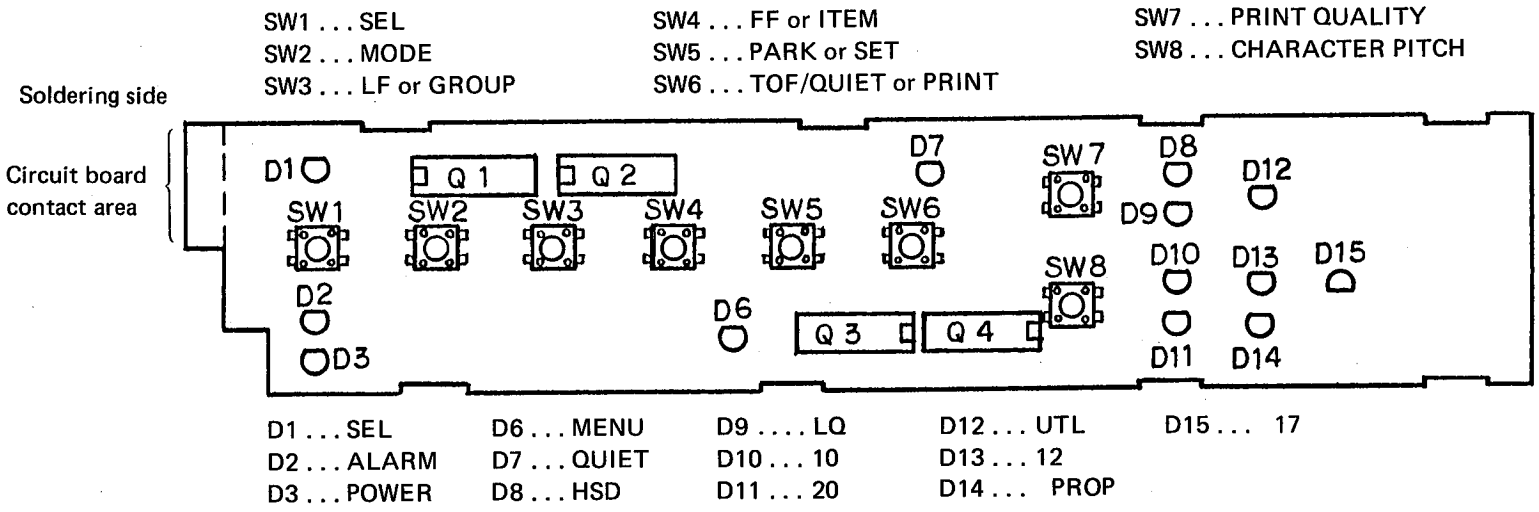


Figure 7-2 Checkpoints of printed circuit board (Rev. No. 3 PCB version No.3)

LXMC-Printed-Circuit Board

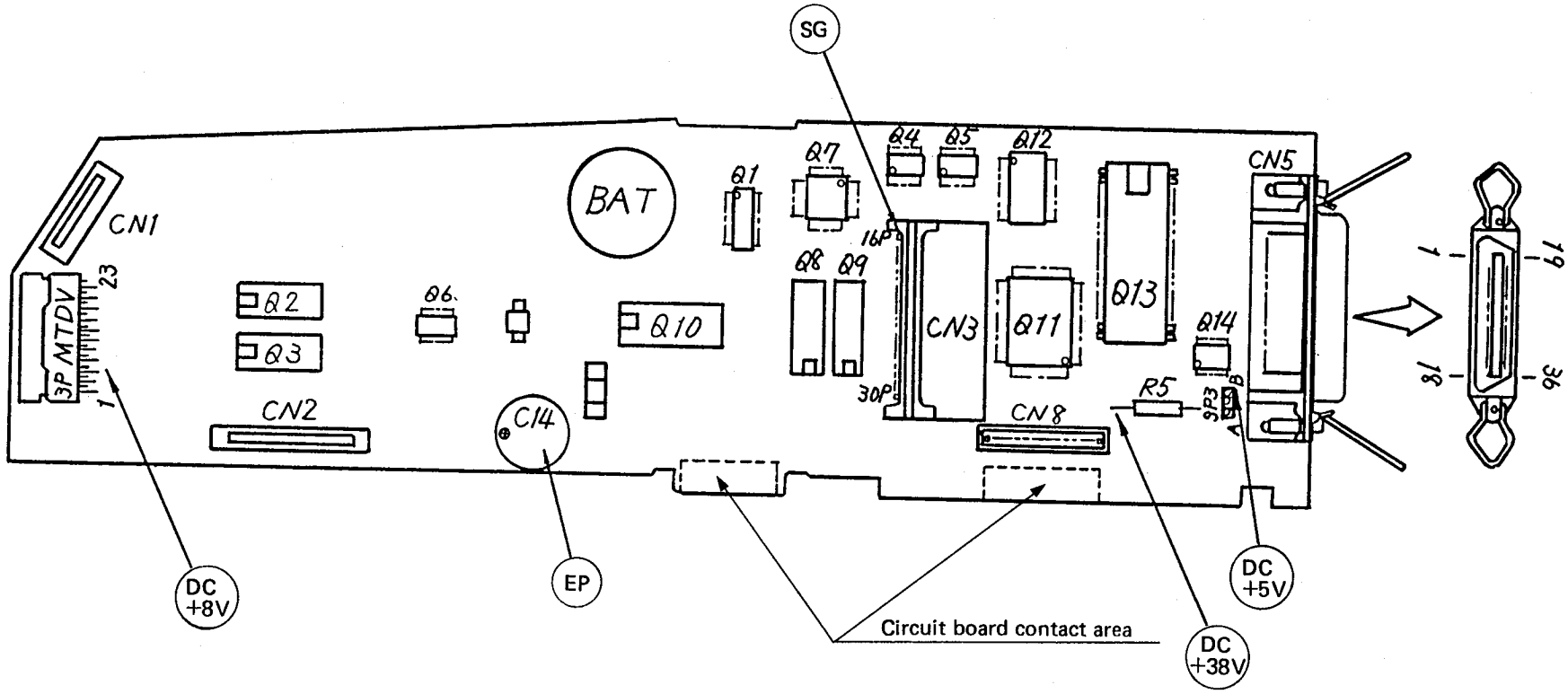


Figure 7-1 Checkpoints of printed circuit board (PCB version No. 8)

LXSP-2 Printed Circuit Board

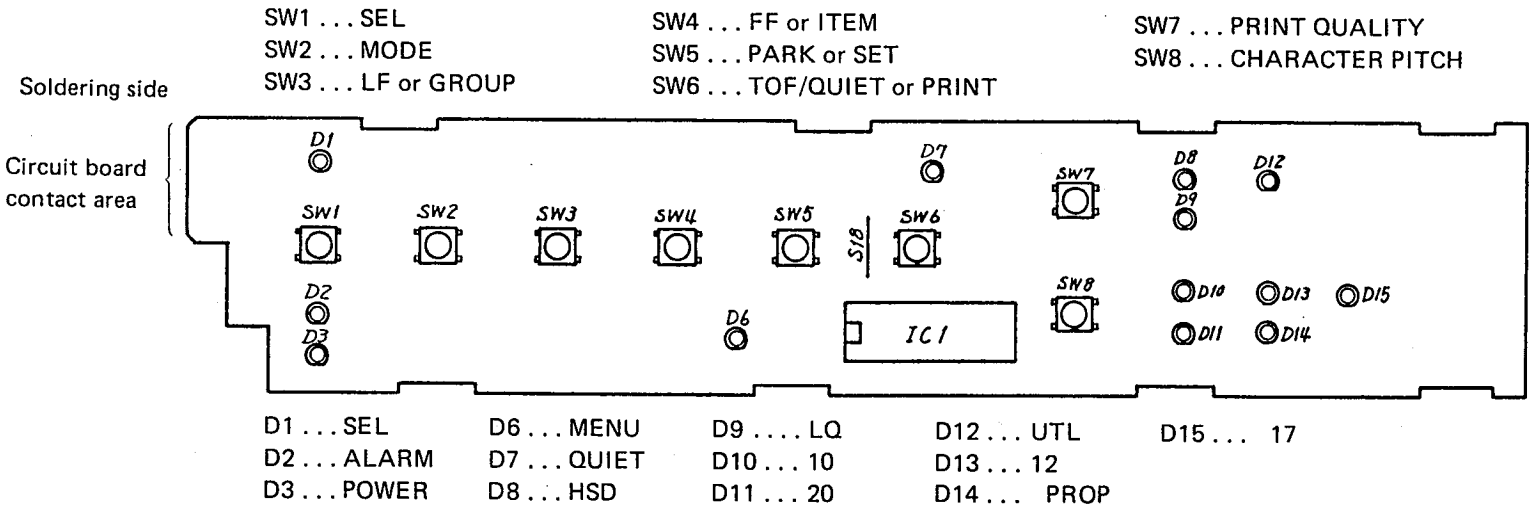


Figure 7-2 Checkpoints of printed circuit board (Rev. No. 4, 6 PCB version No. 4, 6)

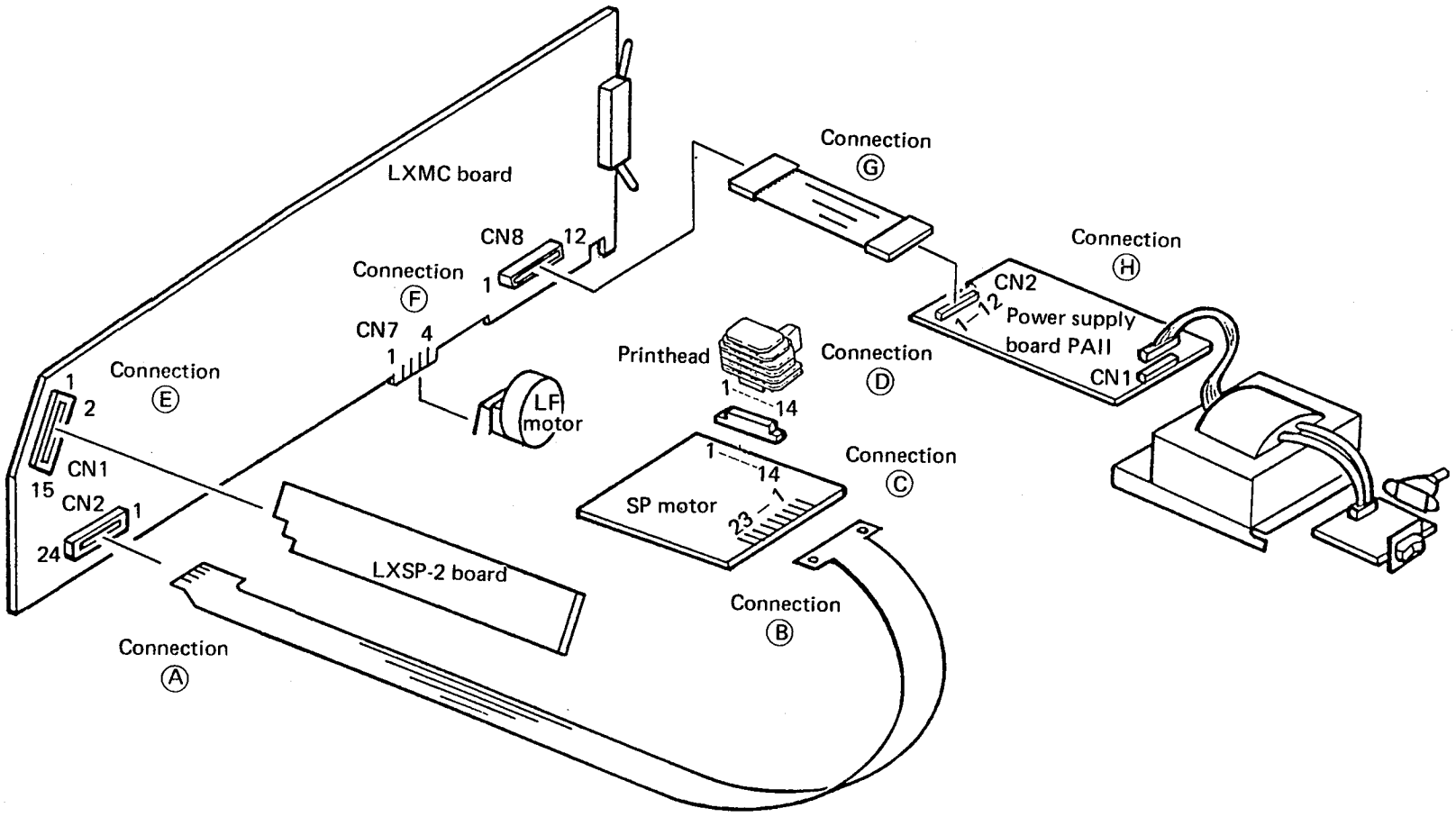


Figure 7-3 Connection locations and pin numbers (PCB version No.8)

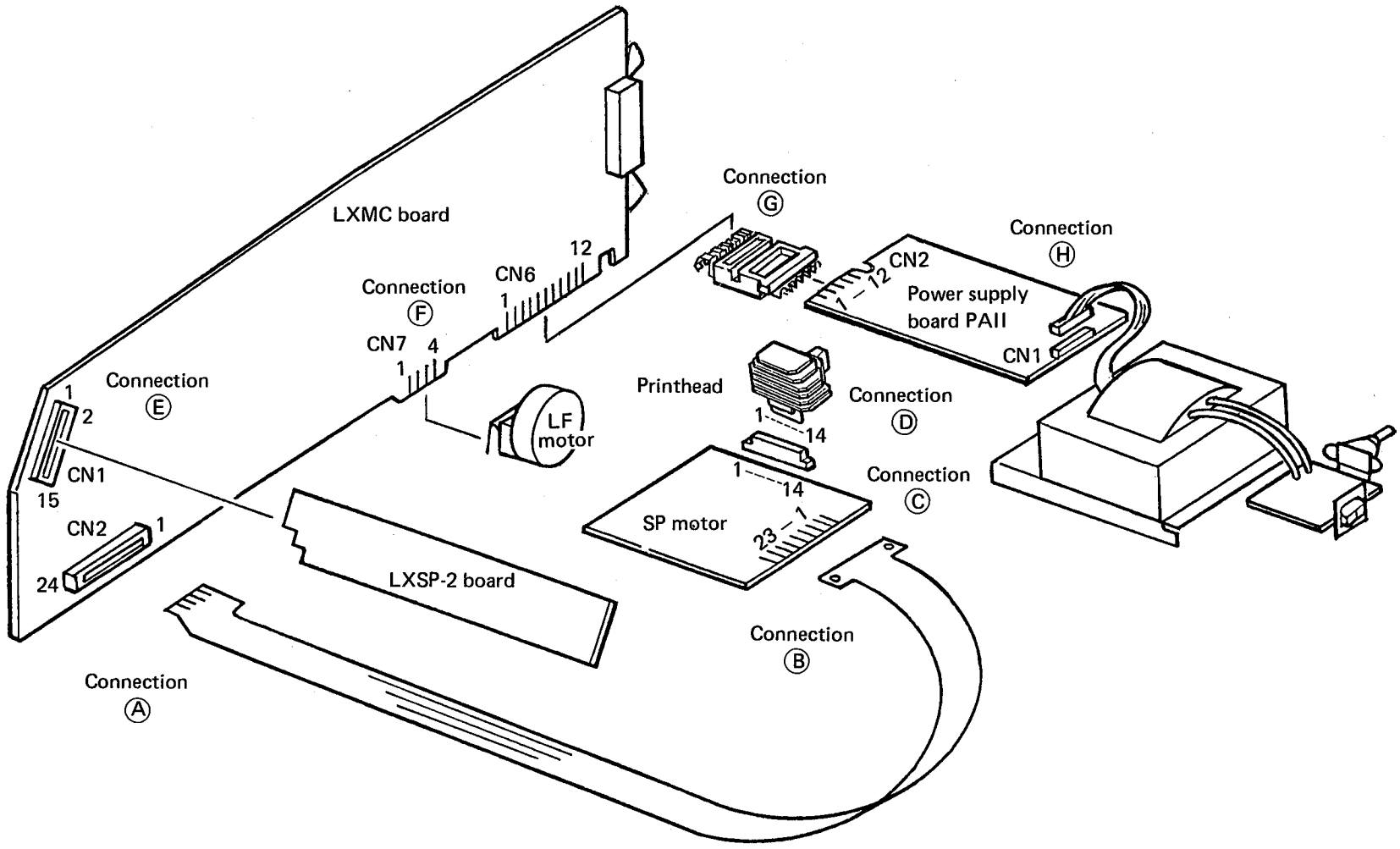


Figure 7-3 Connection locations and pin numbers (PCB version Nos. 2 to 7)

Table 7-4 Pin numbers and signal names

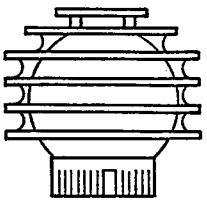
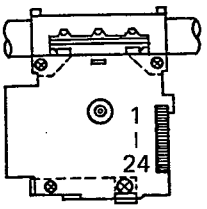
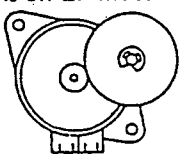
Name	Signal Name	Connection A	B	C	D	E	F	G	H	Coil Resistance	Figure
PRINT HEAD	HEAD GAP	3	3							Approx. 18.8Ω	Pins on printhead Back of printhead  1 ~ 15
	TSD	10	10	7	7						
	+40V	8.9	8.9	8-10	8-10						
	+5V	20	20								
	SG	11.21	11.21	6	6						
	#1	16	16	1	1						
	#2	15	15	2	2						
	#3	4	4	14	14						
	#4	14	14	3	3						
	#5	5	5	13	13						
	#6	13	13	4	4						
	#7	6	6	12	12						
	#8	12	12	5	5						
	#9	7	7	11	11						
SP MOTOR	U	18								Approx. 21Ω	Pins on SP motor  1 24
	V	17									
	W	19									
	ØA	23									
	ØB	22									
LF MOTOR	Ø1						2			Approx. 6.8Ω	Pins on LF motor  4 – 1
							1				
	Ø2						3				
							4				
CN6	+40V							1-3			
	EP							4,5			
	+5V							6,7			
	0V							8,9			
	+8V							10			
	AC 10V							11			
	ALM							12			

Table 7-4 Pin numbers and signal names

Name	Signal Name	Connection								Coil Resis-tance	Figure
		A	B	C	D	E	F	G	H		
OPERATOR PANEL	SEL SW					3					
	MODE SW					4					
	LF SW					5					
	FF SW					6					
	PARK SW					7					
	TOF SW					13					
	PRINT SW					10					
	CHAR SW					12					
	LED' SD					2					
	LED SD CLK					14					
	+5V					1.15					
	0V					8.9					

① Power is not supplied

- Are AC cables connected correctly?

YES

NO

- Connect the AC cables correctly.

- Is the AC fuse blown on the primary side of the filter unit?

NO

YES

- Replace the fuse.

- Are + 5V and + 40V supplied to the control board?

+ 5V : Measurement can be taken between R12 and S1 (control board).

+ 40V : Measurement can be taken between R10 and S1 (control board).

YES

NO

- Is the fuse F1 blown on the power supply board?

NO

YES

- Replace the fuse F1.

- Is the contact pressure for power contact (CN6) normal? (connection Ⓗ part)

YES

NO

- Reseat the control board .

- Replace the power supply board or power contact.

- Replace the control board.

① Power is not supplied (For Main control PCB version No.8 and after)

- Are AC cables connected correctly?

YES / NO

- Connect the AC cables correctly.

- Is the AC fuse blown on the primary side of the filter unit?

NO / YES

- Replace the fuse.

- Are + 5V and + 40V supplied to the control board?

+ 5V : Measurement can be taken between R12 and S1 (control board).

+ 40V : Measurement can be taken between R10 and S1 (control board).

YES / NO

- Is the fuse F1 blown on the power supply board?

NO / YES

- Replace the fuse F1.

- Are the connections of power cable (CN8) normal? (connection Ⓖ part)

YES / NO

- Reseat the control board .

- Replace the power supply board or power cable.

- Replace the control board.

② Space operation does not operate normally (PCB version No.8)

- Is the carriage assembly binding or jammed?

NO

YES

- Check around the carriage assembly and the space motor to repair the mechanism.

- Are + 5V and + 40V supplied to the control board?

YES

NO

- Check that the power cable of CN8 is connected correctly.

NO

YES

- Replace the power unit.

- Reseat the control unit or power cable or power board.

- Is the head cable connected to CN2 correctly? (connection Ⓐ part)

YES

NO

- Connect the head cable to CN2 correctly.

- Replace the control board.

- Remedied?

YES

NO

- Replace the space motor.

- END

② Space operation does not operate normally

- Is the carriage assembly binding or jammed?

NO / YES

- Check around the carriage assembly and the space motor to repair the mechanism.

- Are + 5V and + 40V supplied to the control board?

YES / NO

- Is CN6 power contact pressure correct? (Connection Ⓗ part)

NO / YES

- Replace the power unit.

- Reseat the control unit or power contact or power board.

- Is the head cable connected to CN2 correctly? (connection Ⓐ part)

YES / NO

- Connect the head cable to CN2 correctly.

- Replace the control board.

- Remedied?

YES / NO

- Replace the space motor.

- END

③ Wrong character, character omission or dot omission

- Is the head cable inserted to CN2 correctly? (connection Ⓑ part)

YES

NO

- Reseat the head cable to CN2 correctly. (connection Ⓐ part)

- Replace the print head.
- Remedied?

YES

NO

- Replace the control board.
- Remedied?

NO

YES

- END
- Is the space motor board contact pressure normal? (connection Ⓑ part)

YES

NO

- Reseat the carriage cable.
- Replace the motor board unit.
- END

④ Line feed trouble

- Manually rotate the platen knob.
- Does it rotate smoothly?

YES

NO

- Set the release lever to the open side.
- Does the platen knob rotate smoothly?

NO

YES

- Correct paper setting
- No foreign matter or dust on the platen gear, idler gear or drive gear.
- Smooth meshing of platen gear, idler gear and drive gear.
- Correct installation of push tractor assembly (R) or (L). (See Section 4.3.27.)
- Replacement of push tractor assembly (R) or (L). (See Section 4.3.27.)

- Is connection plate from LF motor connected with LF motor correctly?

YES

NO

- Reseat the control board

- Is connection plate from the control board connected with LF motor correctly?

YES

NO

- Connect it correctly.

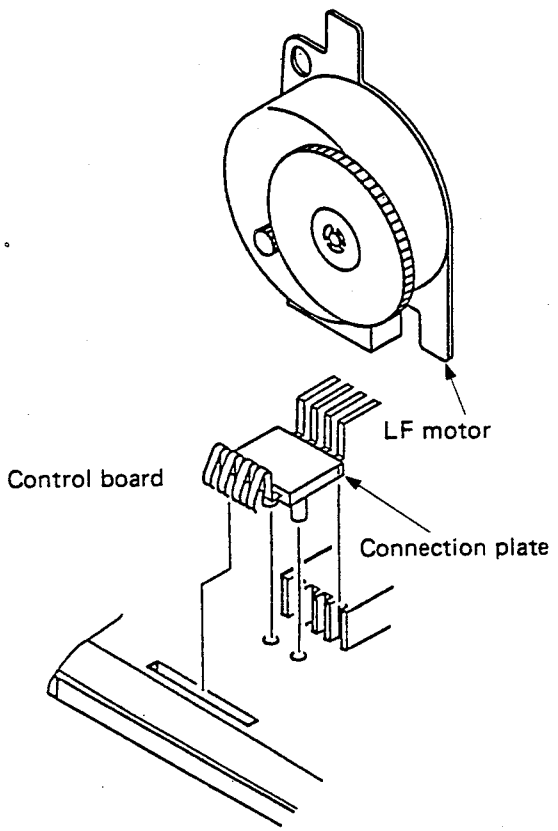
- Replace the control board. (See Section 4.3.5.)
- Remedied?

YES

NO

- Replace the LF motor. (See Section 4.3.22.)

- END



⑤ Malfunction of switch on operator board

- Is the operator board inserted to CN1 correctly? (connection Ⓔ part)

YES / NO

- Connect it correctly.

- Replace the operation board.
- Remedied?

YES / NO

- Replace the control board.

- END

⑥ Data receiving failure

- Is the SELECT lamp on?

YES / NO

- Set to the SELECT mode.

- Is the interface cable connected correctly?

YES / NO

- Connect it correctly.

- Replace the control board.

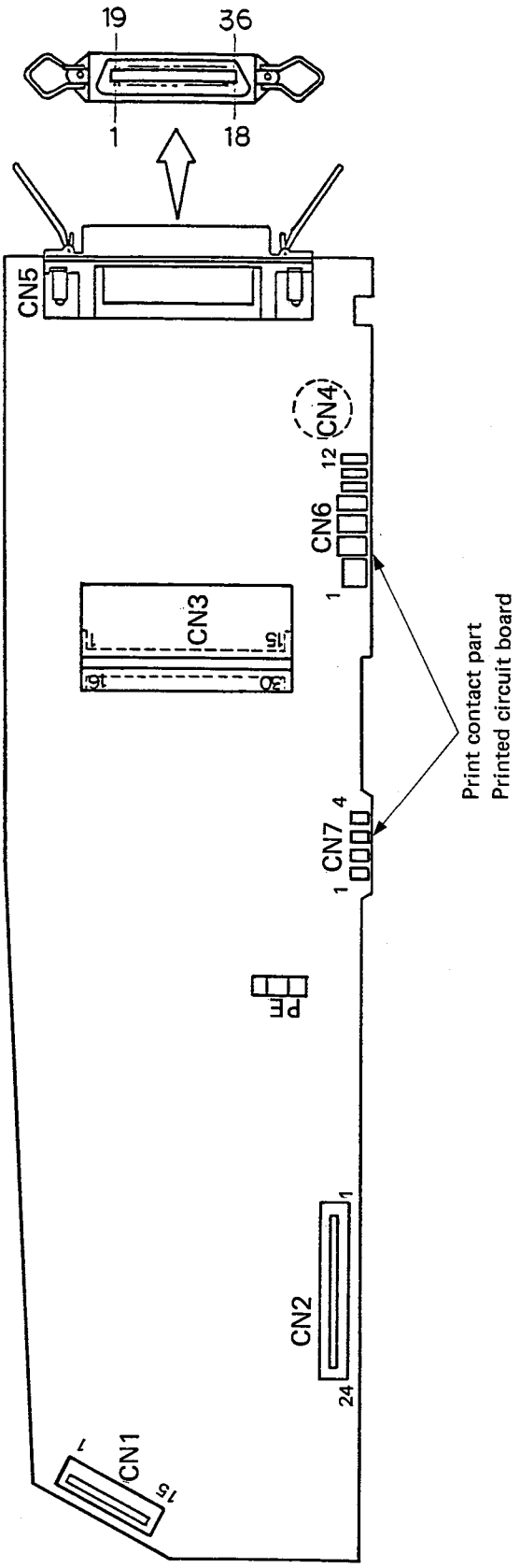
APPENDICES

APPENDIX A PCB LAYOUT

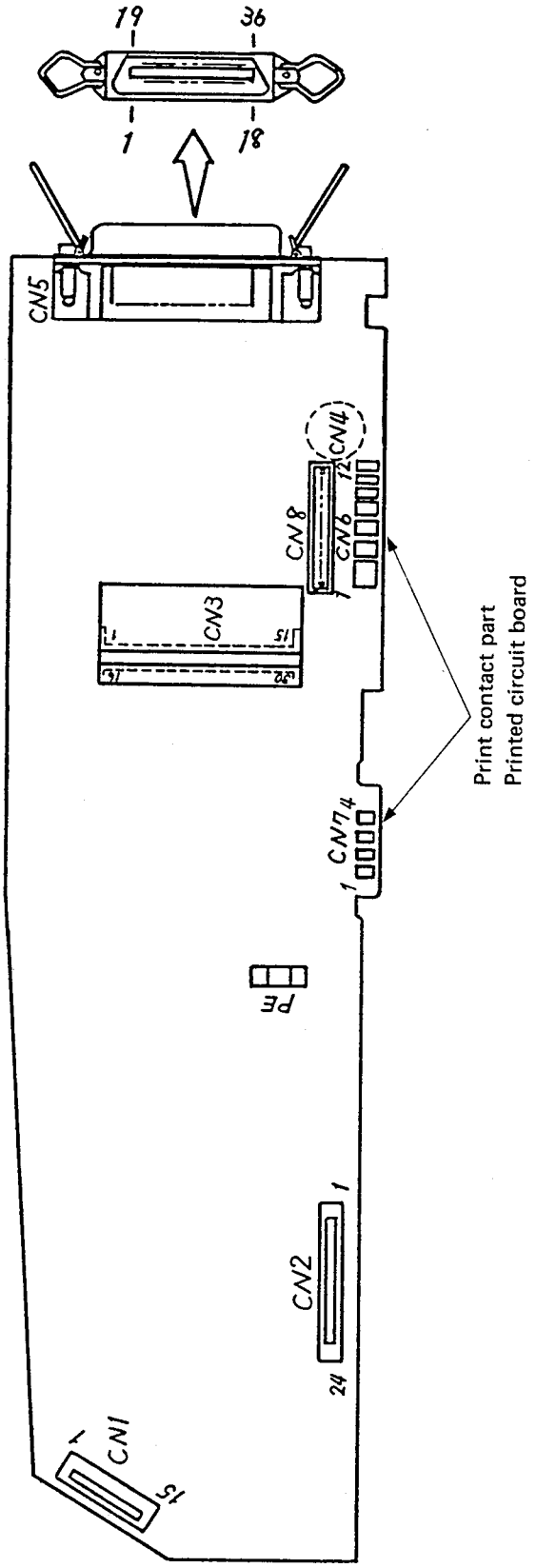
(1) LXMC-PCB (control board)

(2) PAII-PCB or SUII-PCB (power board)

(3) LXSP-2-PCB (operator panel board)

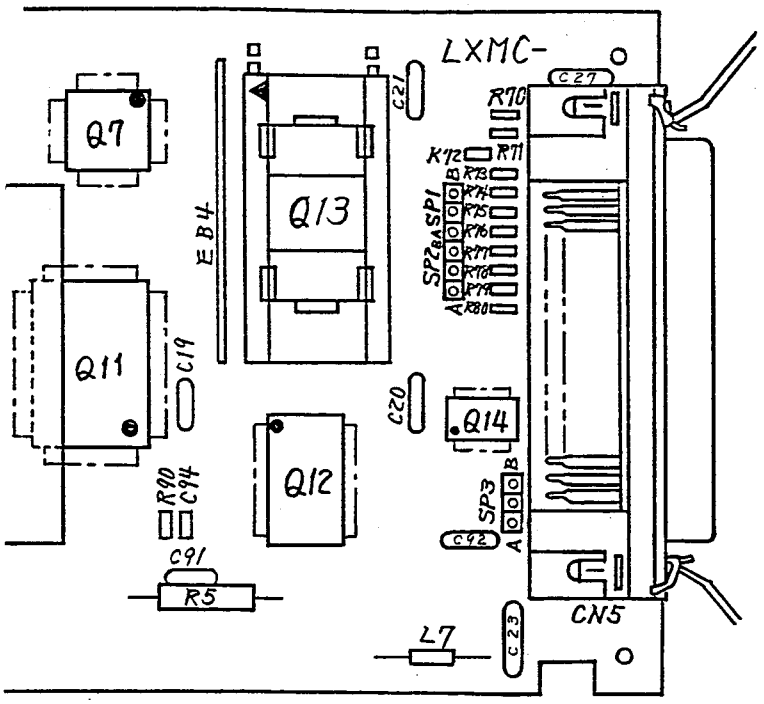


LXMC-PCB (control board) (PCB version Nos. 2 to 7)



LXMC-PCB (control board) (PCB version No.8)

Supplement: Short plug setting



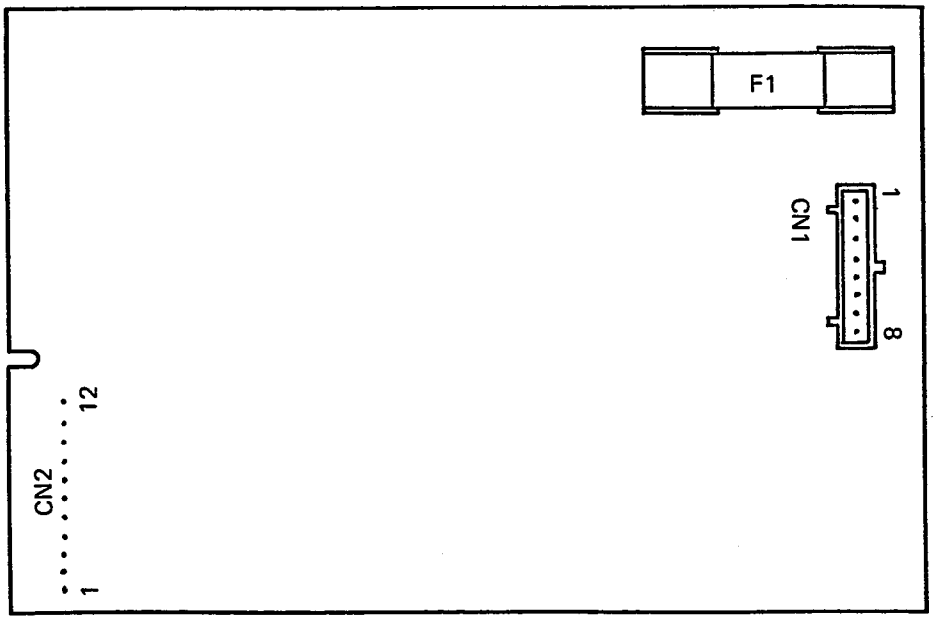
The table below shows the setting method for each application.

The definition of the setting is as follows:

A : A ○ ○ | ○ B

B : A ○ | ○ ○ B

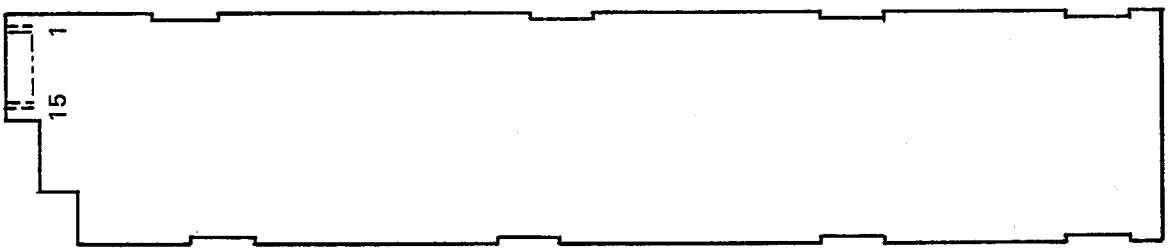
Destination	SP1	SP2	SP3	
ODA (STD)	A	A	A	
ODG (STD)	A	A	A	
ODA (EI)	A	B	A	
ODG (EI)	A	B	A	
ODA (maintenance)	A	B	A	
ODG (maintenance)	A	A	A	For the 28 pins IC socket
ODG (maintenance)	A	B	A	For the 32 pins IC socket



PAII-PCB (power board)

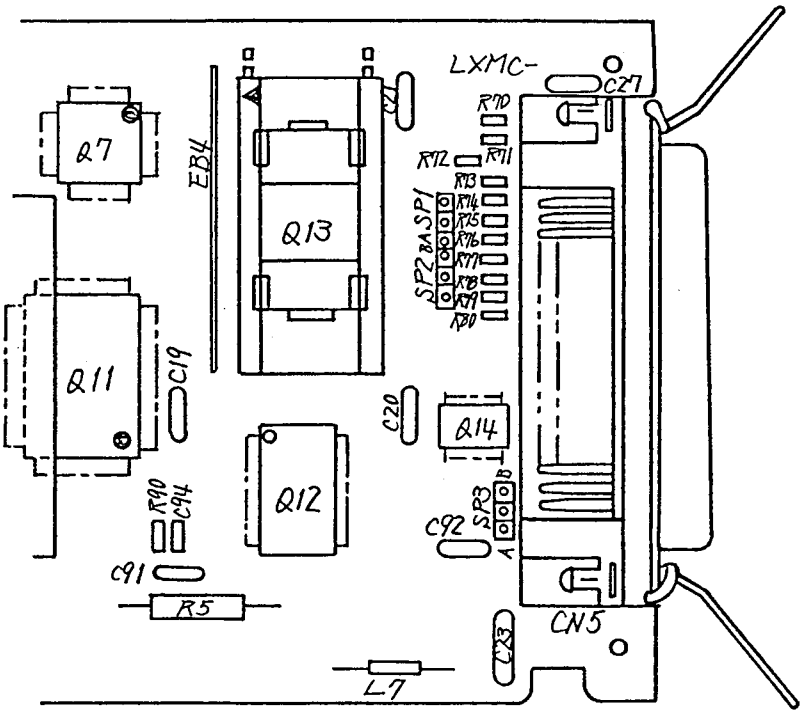
or

DC PSU board for only Europe (OKI-UK)



LXSP-2-PCB (operator panel board)

Supplement: Short plug setting (For PCB version Nos. 4 to 7)



The table below shows the setting method for each application.

The definition of the setting is as follows:

A : A o o o B

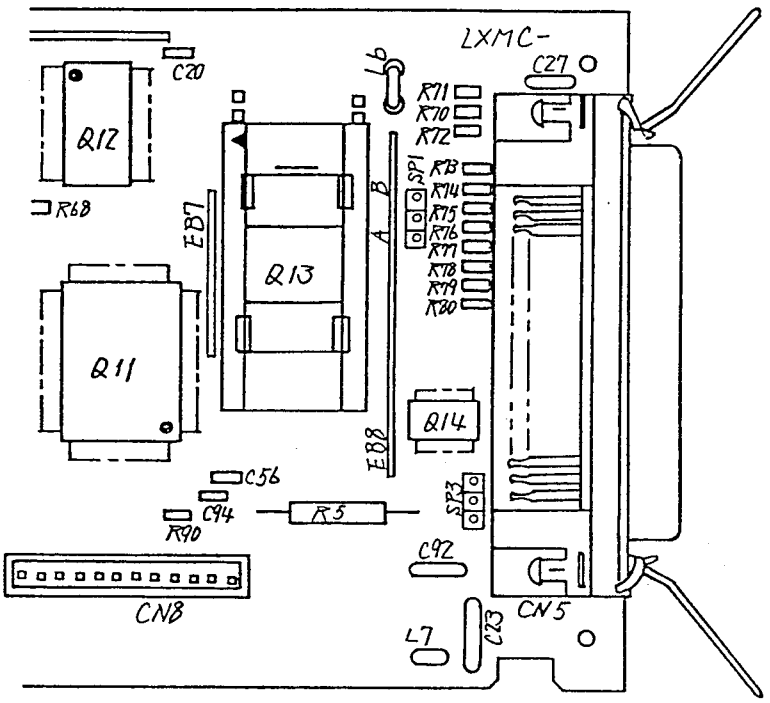
B : A o o o B

Destination	SP1	SP2	SP3
ODA (STD)	A	-	A
ODG (STD)	A	-	A
ODA (EI)	A	-	A
ODG (EI)	A	-	A
ODA (maintenance)	A	-	A
ODG (maintenance)	A	-	A
ODG (maintenance)	A	-	A

For the 28 pins IC socket

For the 32 pins IC socket

Supplement: Short plug setting (For PCB version No. 8 and after)



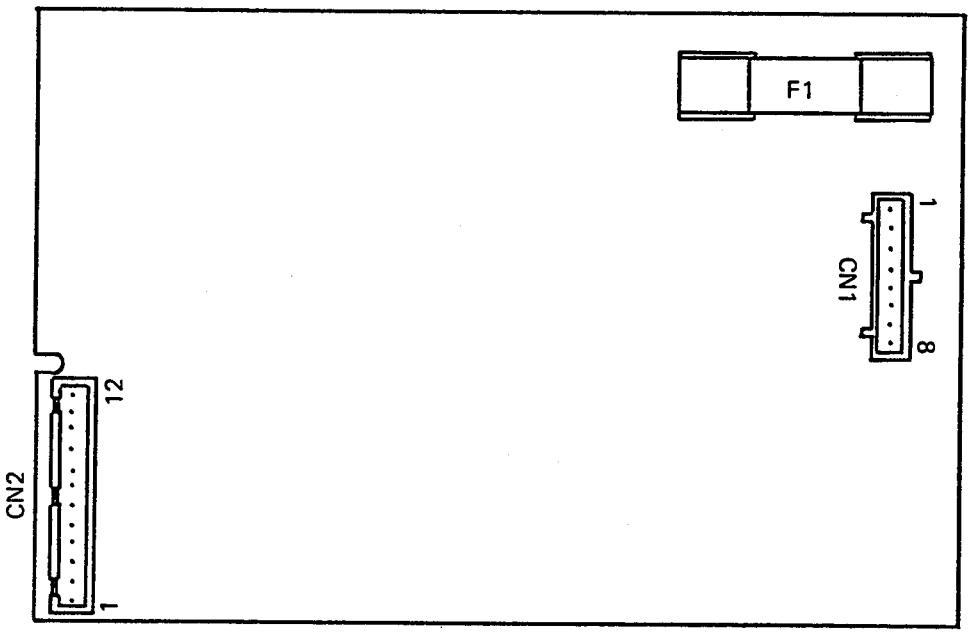
The table below shows the setting method for each application.

The definition of the setting is as follows:

A : A o o o B

B : A o o o B

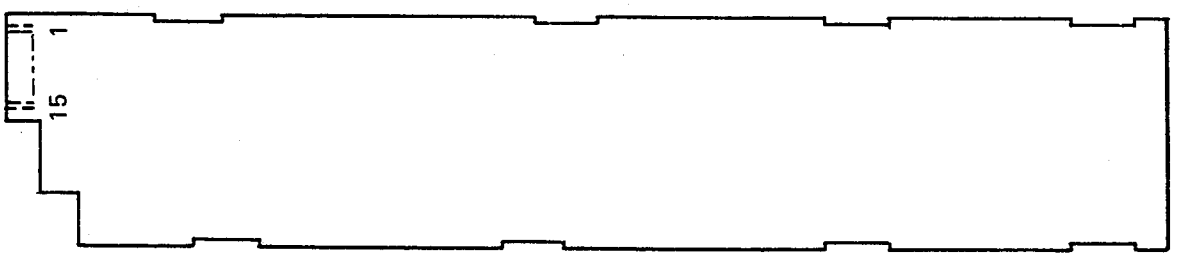
Destination	SP1	SP2	SP3
ODA (STD)	A		A
ODA (EI)	A		A
ODA (maintenance)	A		A



SUII-PCB (power board) (For Main control PCB version No.8 and after)

or

DC PSU board for only Europe (OKI-UK)



LXSP-2-PCB (operator panel board)

APPENDIX B SIGNAL LIST

Signal abbreviation	Signal name	Function
0V	Signal Ground	Ground for logic circuits
+ 5V	+ 5 volt	Power supply for logic circuits
+ 8V	+ 8 volt	Power supply for linear circuits
+ 38V	+ 38 volt	Power supply for drive circuits
AD0 - AD7	Address Data Signal	80C154 address/data bus signal
A7 - A0	Address Bus	80C154 address bus signal
A15 - A8	Address Bus Signal	80C154 address bus signal
A16	Address Signal	Address signal
AC10V	AC 10 Volt	Power supply for RS-232C interface ± 9 V
$\overline{\text{ACK}}$	Acknowledge	Centronics I/F signal Signal which indicates that inputting of data to be received has been completed.
$\overline{\text{AUTO FEED}}$	Automatic Paper Feed Signal	Centronics interface signal When this signal is active, line feed is performed after printout. (However, this signal is effective only for printers which correspond to EPSON emulation.)
BUSY	Busy	Centronics I/F signal Signal which indicates that the printer is busy.
$\overline{\text{CAS1}}$	Column Address Strobe	Signal for strobing a column address to the D-RAM
$\overline{\text{CAS2}}$	Column Address Strobe	Signal for strobing a column address to the D-RAM
$\overline{\text{CAS3}}$	Column Address Strobe	Signal for strobing a column address to the D-RAM
CD	Carrier Detect	RS-232C interface signal Signal which indicates that the host side is sending data.
CHAR SW-N	Character Pitch Switch Signal	Signal which indicates that the switch for selecting print pitch for 10, 12 and so forth has been pressed.

[Note] Signal abbreviation with − denotes signal is active in low state.
Signal abbreviation without − denotes signal is active in high state.

Signal abbreviation	Signal name	Function
COM-P	Common	Common line of the power supply for driving the head
CSF CW CLK	Cut-Sheet Feeder Command 1	CSF I/F signal Operation instruction signal 1
CSF CCW CLK/BZ	Cut-Sheet Feeder Command 2	CSF I/F signal Operation instruction signal 2
$\overline{\text{CSF}}$ $\overline{\text{CONNECT}}$	Cut-Sheet Feeder Connect Signal	CSF interface signal Indicates that CSF is connected.
CTS	Clear to Send	RS-232C interface signal Signal which indicates that the host side is ready.
DATA1-DATA8	DATA	Centronics I/F signal Signals for receiving data
D-RAMA7 - D-RAMA0	D-RAM Address	Address bus signal for the D-RAM
DSR	Data Set Ready	RS-232C interface signal Signal which indicates that the host side has completed the preparations for sending data.
DTR	Data Terminal Ready	RS-232C interface signal Signal indicating a printer is ready.
EP	Power Ground	Ground of the drive circuit system.
$\overline{\text{FAULT}}$	Fault Signal	Centronics I/F signal Signal for displaying alarm state of a printer.
FF	Form Feed Switch	Signal which indicates that FF switch has been pressed.
FG	Frame Ground	Ground for maintenance
HD ALM	Head Alarm	Signal for detecting an abnormality in the head drive circuit.
HEAD-9- HEAD-1	Head Data	Printing data signal
$\overline{\text{HEAD GAP}}$	Head Gap Signal	Signal which indicates that the head gap is set to range "3".
$\overline{\text{HEAD ON}}$	Head on Signal	Head drive signal

Signal abbreviation	Signal name	Function
$\overline{\text{HEAD TMPCT}}$	Head Temperature Control	Head temperature detection level selection signal
HEAD TEMP	Head Temperature	Signal which indicates that the head temperature has risen more than the specified value.
$\overline{\text{I-PRIME}}$	Input Prime	Centronics I/F signal Signal for initializing a printer.
IF DATA8 - IF DATA1	Interface Data	Data received via the centronics and RS-232C interface.
$\overline{\text{IFRD}}$	Interface Read	Timing signal for the RS-232C interface control side to read data from the printer control side.
$\overline{\text{IPT}}$	Interrupt	Interrupt signal to 80C154.
LED SD	LED Send Data	Serial data to light/extinguish LEDs on the operator panel.
LED SD CLK	LED Send Data Clock	Shift clock for serial data to light/extinguish LEDs on the operator panel.
$\overline{\text{LFOVD}}$	Line Feed Over Drive	Signal for controlling slice levels of LF motor driving currents.
$\overline{\text{LF HOLD}}$	Line Feed Pulse Motor Hold	Signal to change the slice level while LF motor is in the hold mode.
LF ø3	Line Feed Phase 3	LF motor phase reversing signal.
LF ø4	Line Feed Phase 4	LF motor phase reversing signal.
LF	Line Feed Switch Signal	Signal which indicates that LF switch has been pressed.
MODE	Mode Switch Signal	Signal which indicates that the mode switch for selecting PRINT/MENU has been pressed.
PARK	Parking Switch Signal	Signal which indicates that parking switch has been pressed.
PE	Paper End	Centronics I/F signal Signal which indicates that the printer is in the paper end state.
PHASE A	Phase Signal A	Space motor two-phase encoder output signal.
PHASE B	Phase Signal B	Space motor two-phase encoder output signal.
PRINT	Print Quality Switch Signal	Signal which indicates that the switch for specifying utility, letter quality mode has been pressed.

Signal abbreviation	Signal name	Function
$\overline{\text{PSEN}}$	Program Store Enable	Timing signal for 80C154 to fetch an external program.
RxD	Receive Data	RS-232C interface signal Reception signal line.
RxDATA	Receive Data	Signal which indicates data reception by a centronics or RS-232C interface.
$\overline{\text{RAS}}$	Row Address Strobe	Row address strobe signal to D-RAM.
$\overline{\text{RD}}$	Read	Read signal from the CPU (80C154).
RET-SG	Return Signal Ground	Centronics I/F signal Return ground for a centronics I/F signal line.
RST IN	Reset In	RS-232C interface circuit initialize signal.
RST OUT	Reset Out	Printer initialize signal.
RTS	Request to Send	RS-232C interface signal Sending request signal.
$\overline{\text{S-I/F ON}}$	Serial Interface On	Control signal for a handshake between the print control side and the RS-232C interface control side.
S-I/F RST	Serial Interface Reset	Signal for soft resetting the RS-232C interface control port.
SEL	Select Switch Signal	Signal which indicates the SEL switch has been pressed.
SELECT	Select	Centronics I/F signal Signal which indicates that the printer is ready to receive data.
SG	Signal Ground	Ground for logic circuits.
$\overline{\text{SLCTIN}}$	Select In	Centronics interface signal Signal which controls valid/invalid DC1/DC3 signal. (However, this signal is effective only for printers which correspond to EPSON emulation.)
SP ON/OFF	Space On-Off Signal	Signal for controlling slice levels of DC motor driving current.
SPALM	Space Alarm	Signal for detecting an abnormality in the driving circuit of the spacing motor.

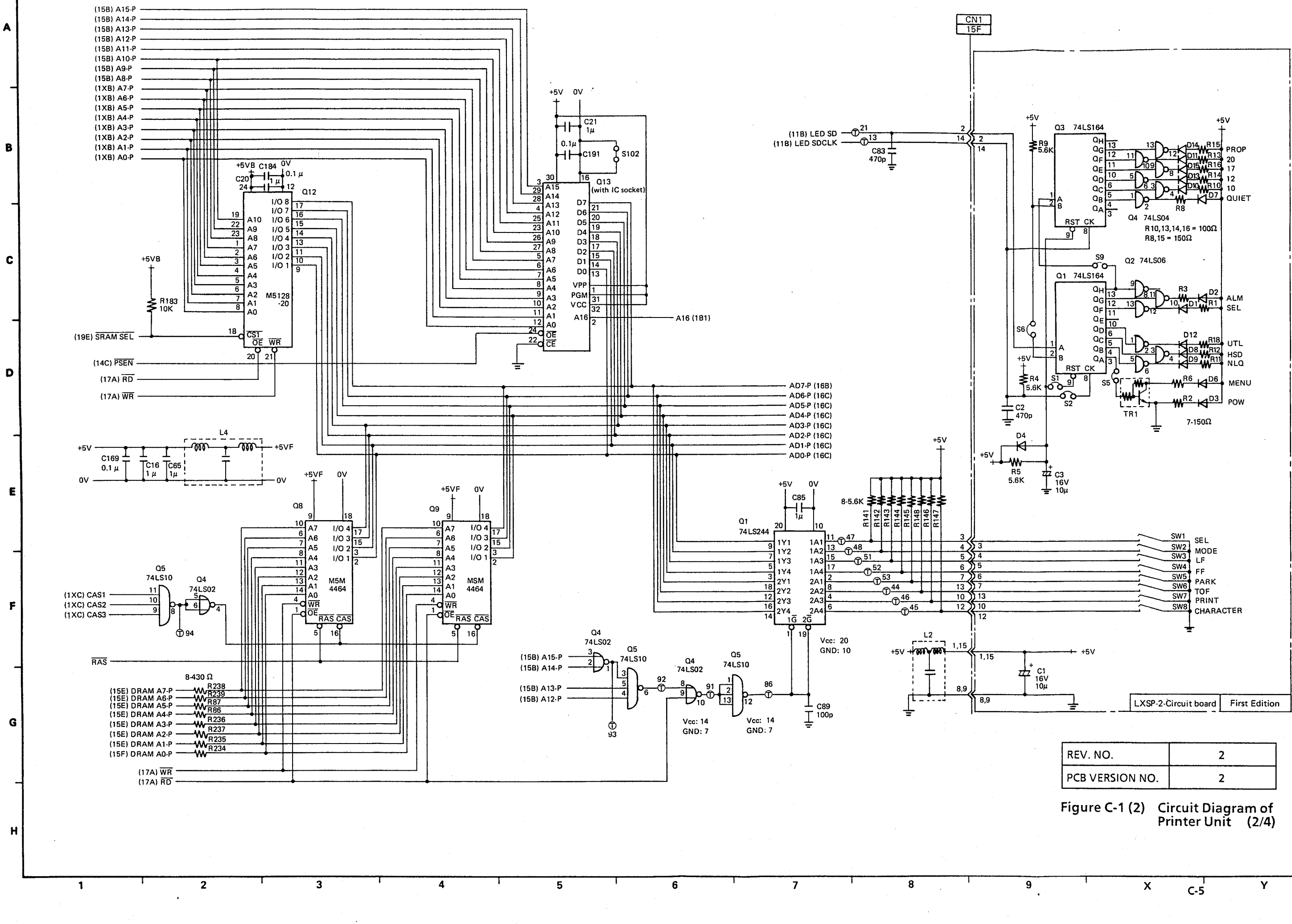
Signal abbreviation	Signal name	Function
SPD/A	Space Digital-Analog Signal	Signal for controlling a DC motor driving current.
SP U	Space Motor-U	Phase signals of the DC space motor.
SP V	Space Motor-V	
SP W	Space Motor-W	
$\overline{\text{SRAM SEL}}$	SRAM Select	S-RAM chip select signal
SSD	Supervisory Send Data	RS-232C interface signal Reception enabled state indication signal.
$\overline{\text{STB}}$	Data Strobe	Centronics interface signal Timing signal for making the printer receive data.
TxD	Transmit Data	RS-232C interface signal Transmission signal line.
TOF	Top of Form Switch signal	Signal which indicates that the TOF switch has been pressed.
$\overline{\text{WR}}$	Write	Write signal from the CPU (80C154).

	D-RAM ADDRESS
CAS1	4000 ~ 7FFF
CAS2	8000 ~ BFFF
CAS3	C000 ~ FFFF

*LSI address conversion required.

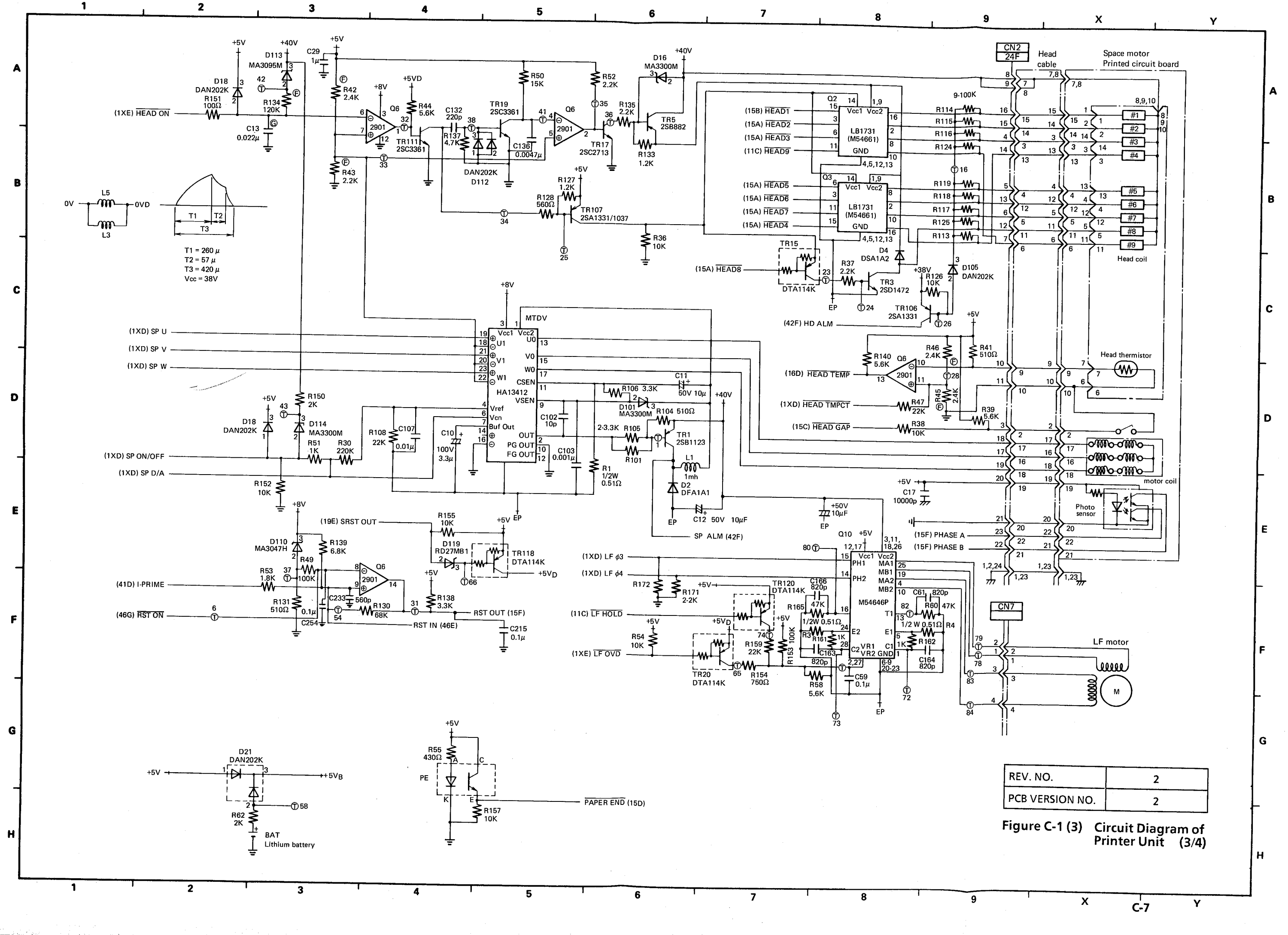
REV. NO.	2
PCB VERSION NO.	2

Figure C-1 (1) Circuit Diagram of Printer Unit (1/4)



REV. NO.	2
PCB VERSION NO.	2

Figure C-1 (2) Circuit Diagram of Printer Unit (2/4)



REV. NO.	2
PCB VERSION NO.	2

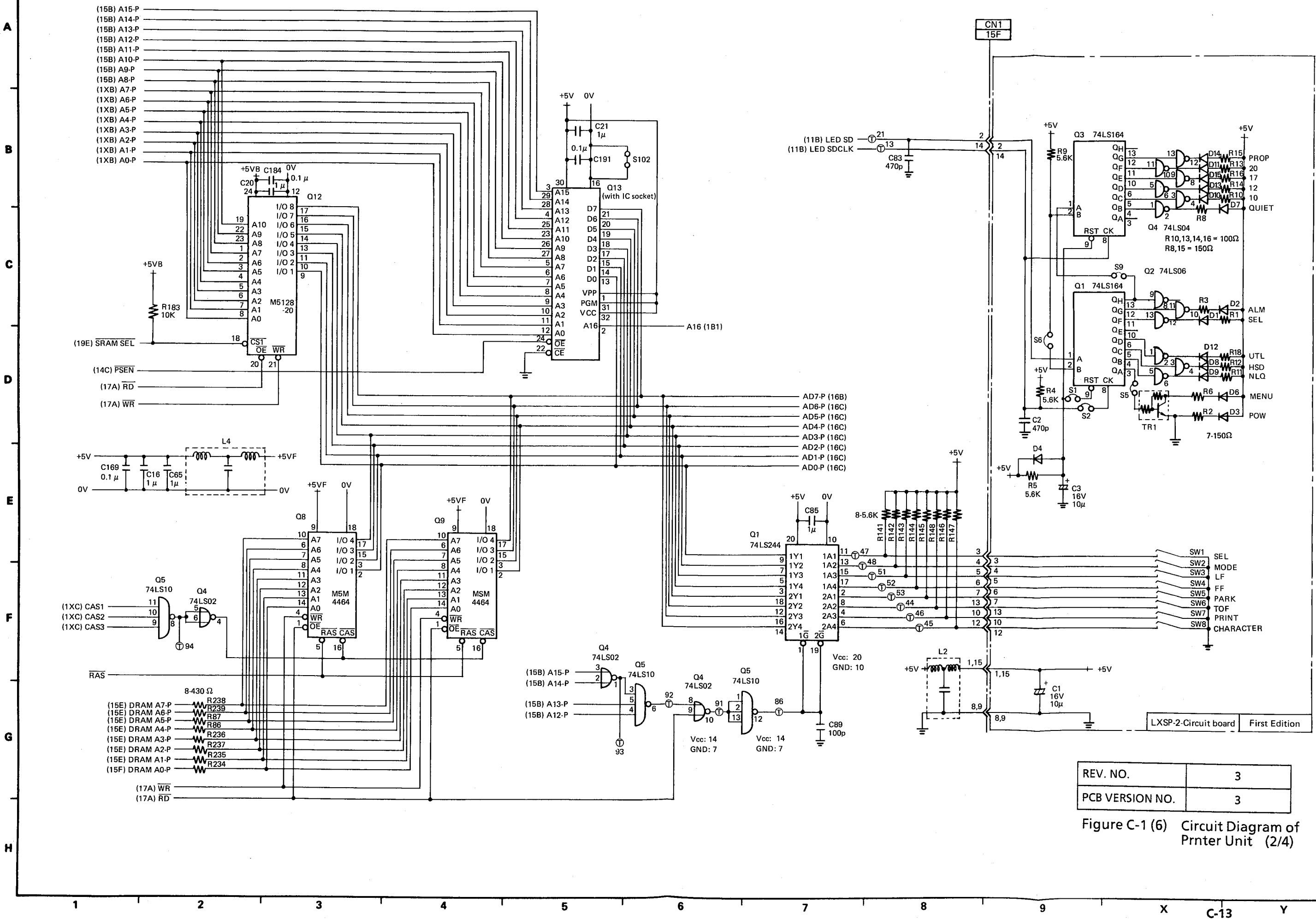
Figure C-1 (3) Circuit Diagram of Printer Unit (3/4)

	D-RAM ADDRESS
CAS1	4000 ~ 7FFF
CAS2	8000 ~ BFFF
CAS3	C000 ~ FFFF

*LSI address conversion required.

REV. NO.	3
PCB VERSION NO.	3

Figure C-1 (5) Circuit Diagram of Printer Unit (1/4)

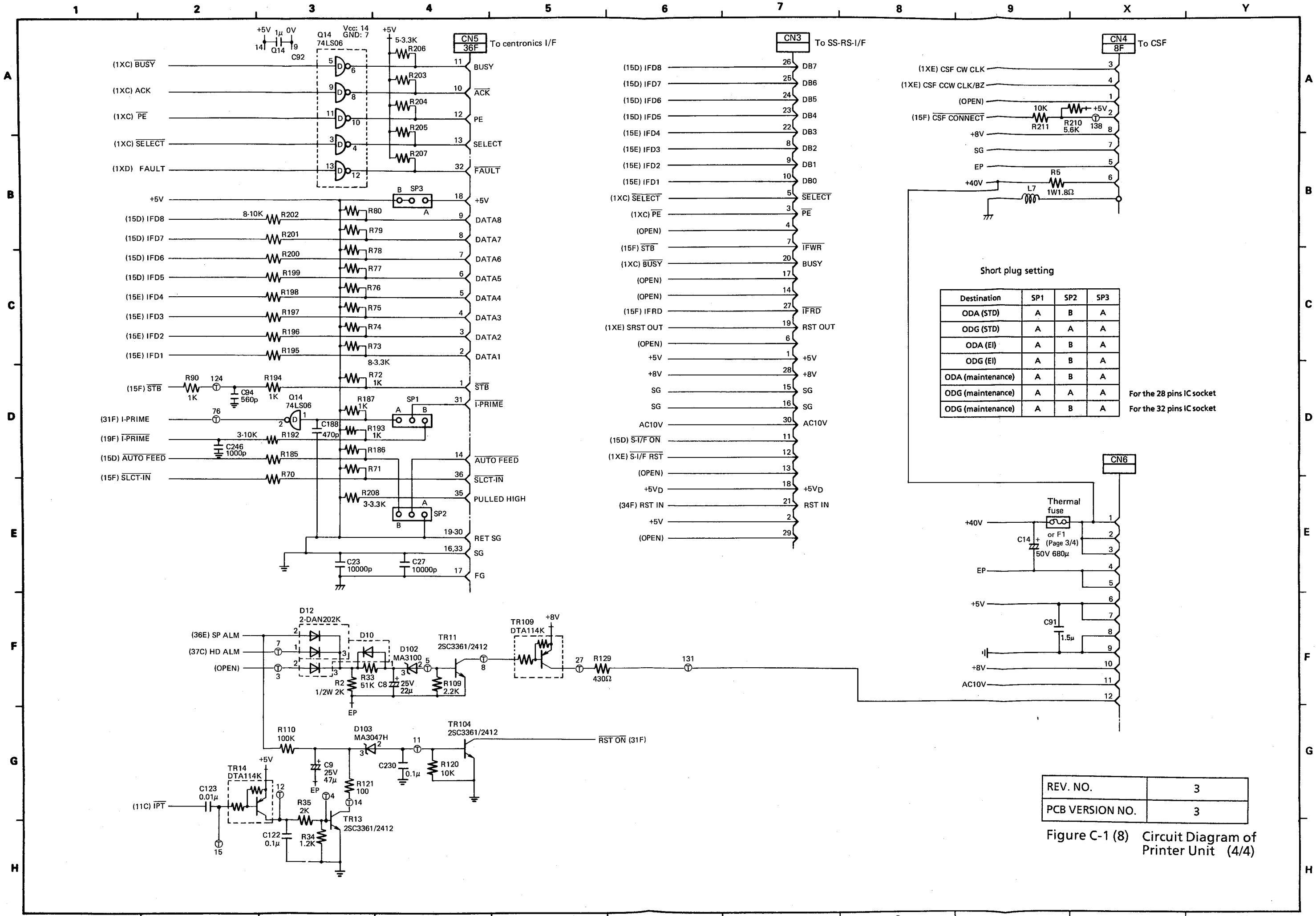


REV. NO.	3
PCB VERSION NO.	3

Figure C-1 (6) Circuit Diagram of Prnter Unit (2/4)

REV. NO.	3
PCB VERSION NO.	3

Figure C-1 (7) Circuit Diagram of Printer Unit (3/4)



REV. NO.	3
PCB VERSION NO.	3

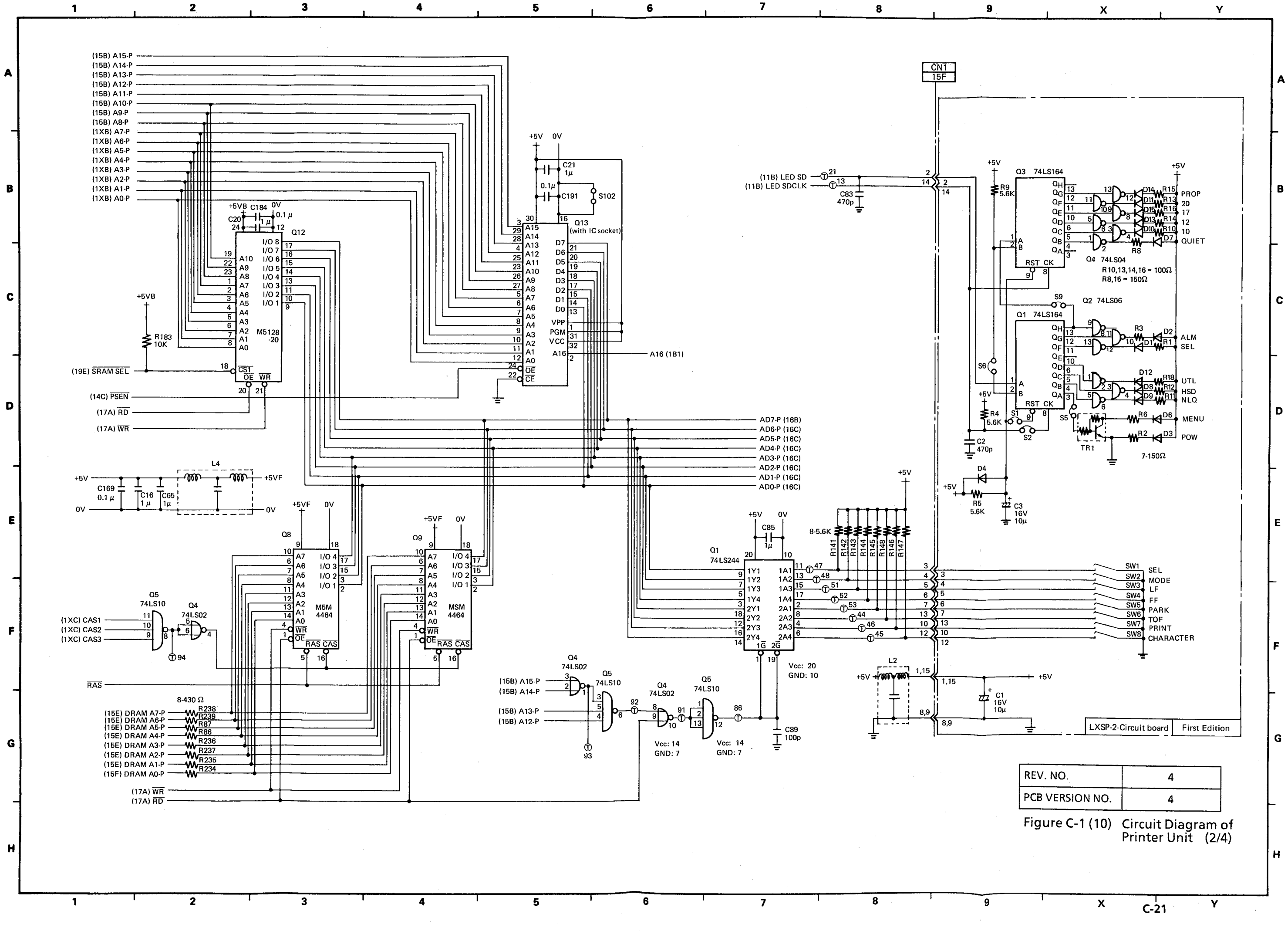
Figure C-1 (8) Circuit Diagram of Printer Unit (4/4)

	D-RAM ADDRESS
CAS1	4000 ~ 7FFF
CAS2	8000 ~ BFFF
CAS3	C000 ~ FFFF

*LSI address conversion required.

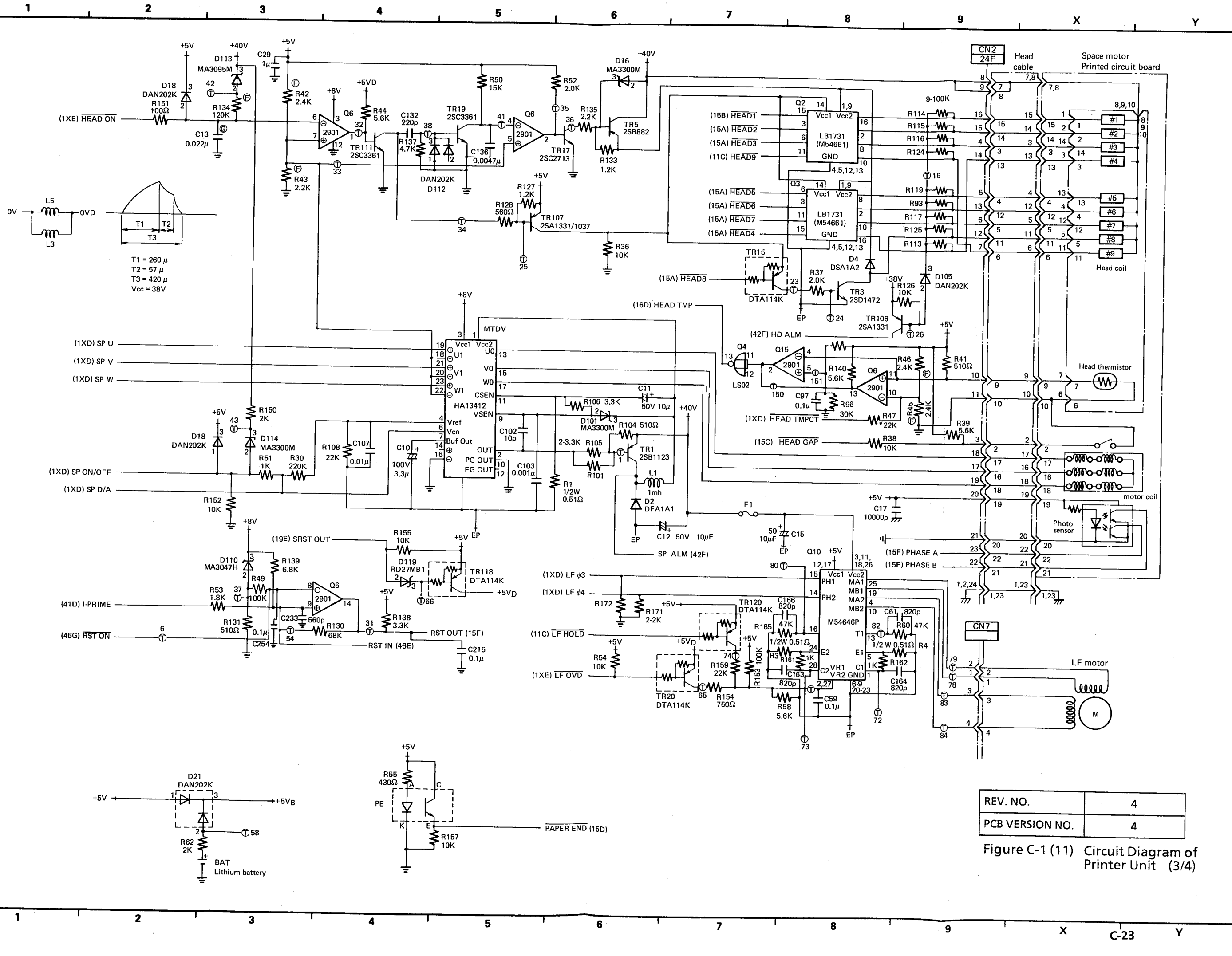
REV. NO.	4
PCB VERSION NO.	4

Figure C-1 (9) Circuit Diagram of Printer Unit (1/4)



REV. NO.	4
PCB VERSION NO.	4

Figure C-1 (10) Circuit Diagram of Printer Unit (2/4)



REV. NO.	4
PCB VERSION NO.	4

Figure C-1 (11) Circuit Diagram of Printer Unit (3/4)

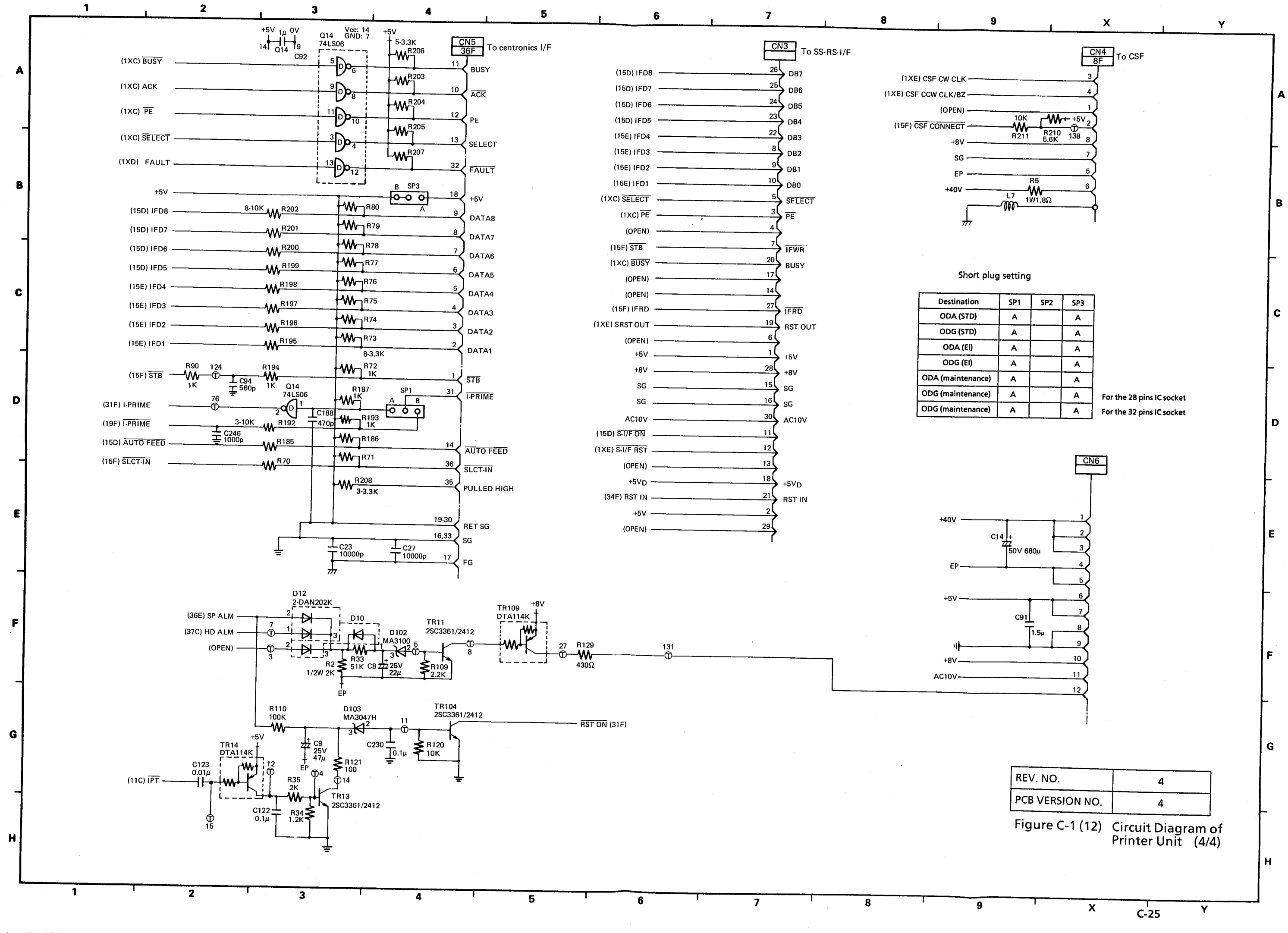


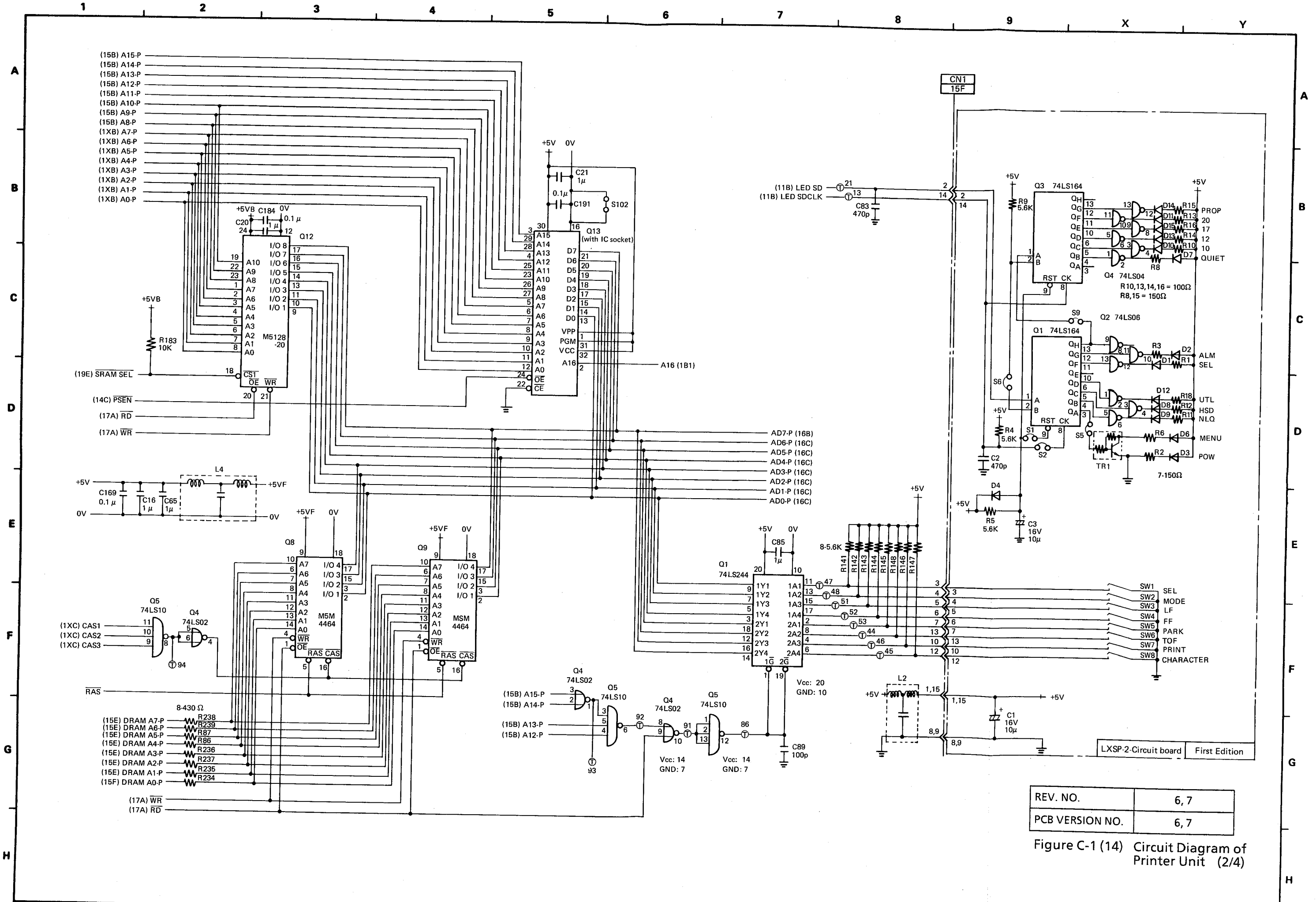
Figure C-1 (12) Circuit Diagram of Printer Unit (4/4)

	D-RAM ADDRESS
CAS1	4000 ~ 7FFF
CAS2	8000 ~ BFFF
CAS3	C000 ~ FFFF

*LSI address conversion required.

REV. NO.	6, 7
PCB VERSION NO.	6, 7

Figure C-1 (13) Circuit Diagramof Printer Unit (1/4)

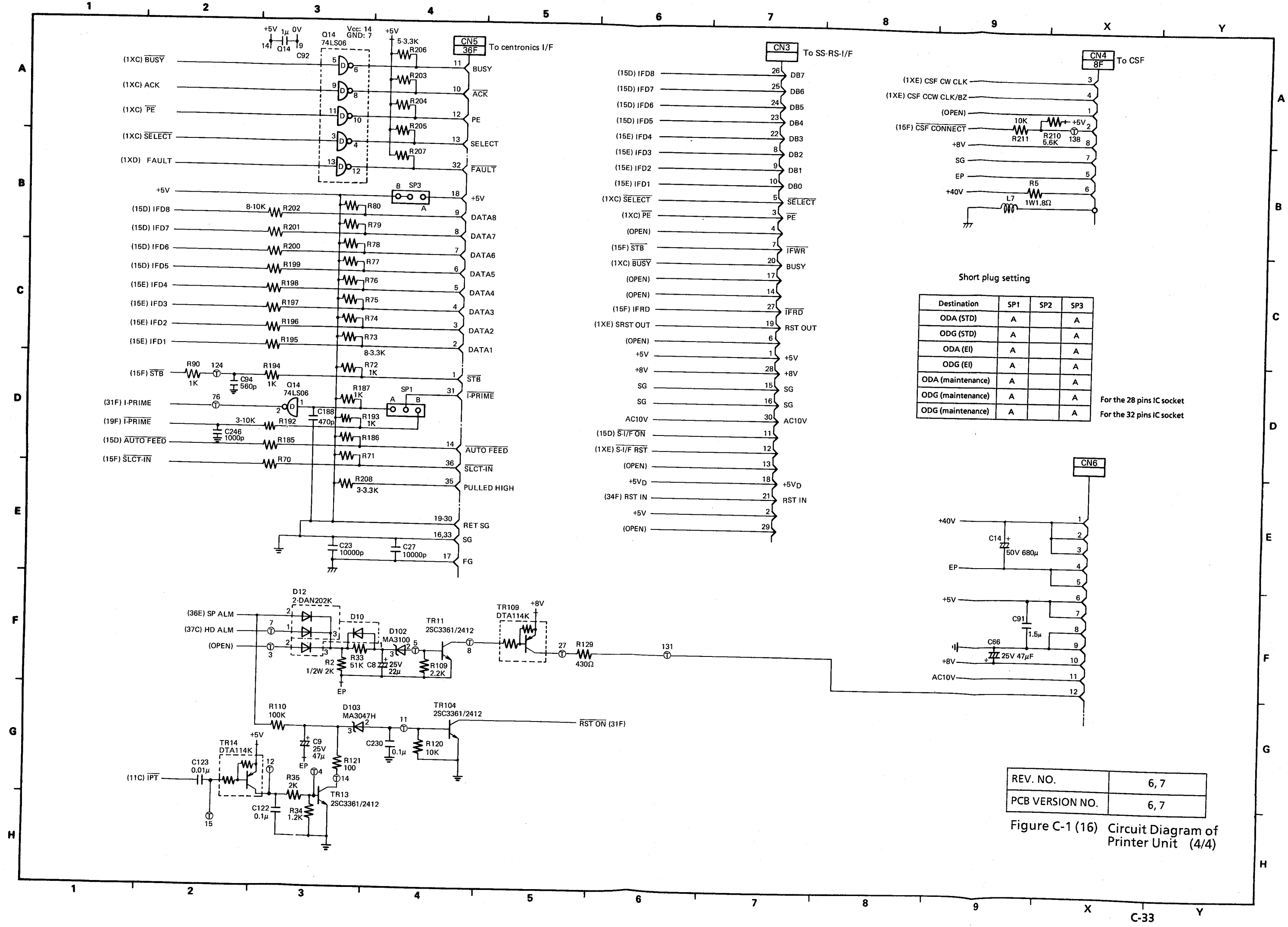


REV. NO.	6, 7
PCB VERSION NO.	6, 7

Figure C-1 (14) Circuit Diagram of Printer Unit (2/4)

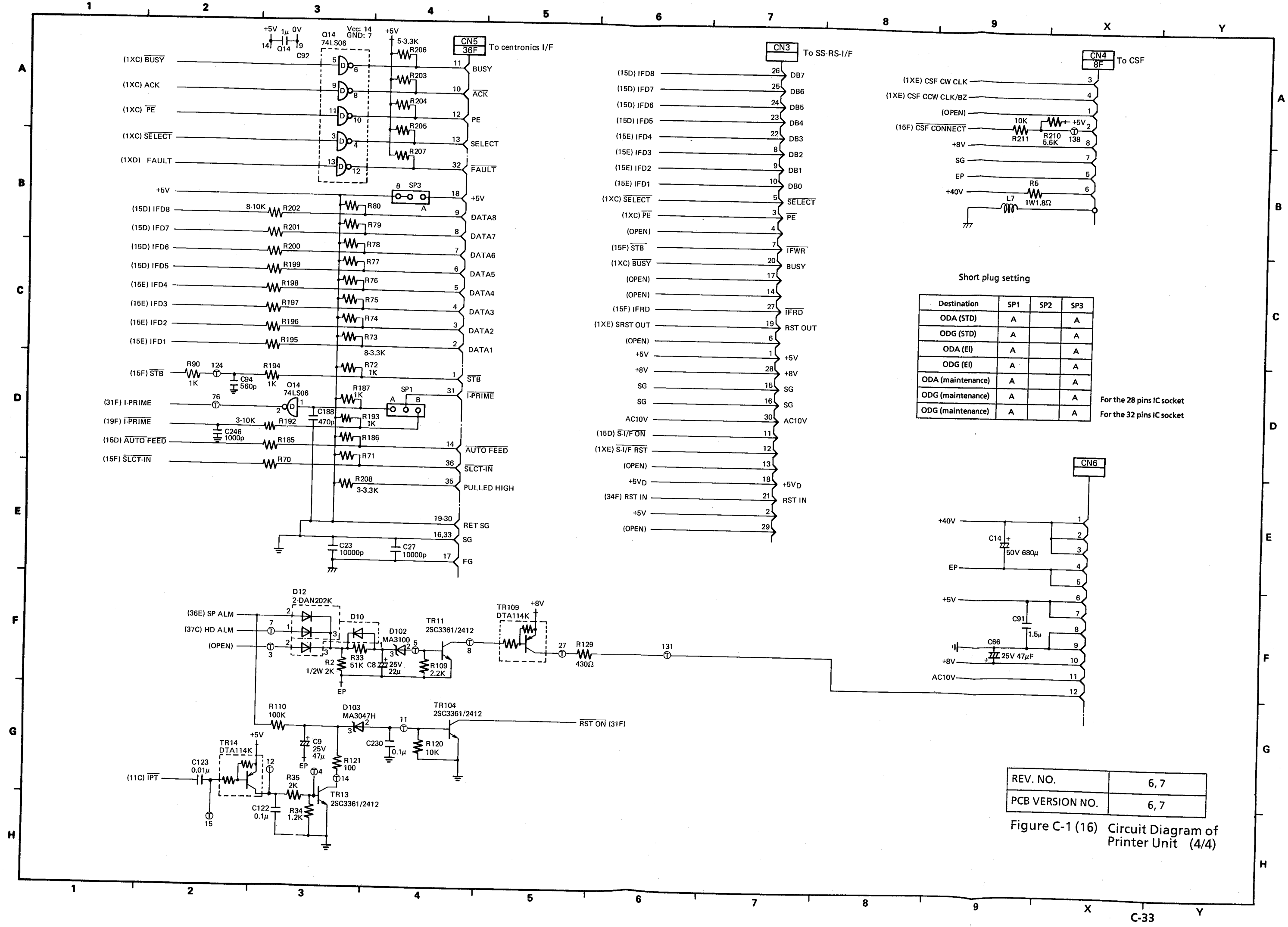
REV. NO.	6, 7
PCB VERSION NO.	6, 7

Figure C-1 (15) Circuit Diagram of Printer Unit (3/4)



REV. NO.	6, 7
PCB VERSION NO.	6, 7

Figure C-1 (16) Circuit Diagram of Printer Unit (4/4)



REV. NO.	6, 7
PCB VERSION NO.	6, 7

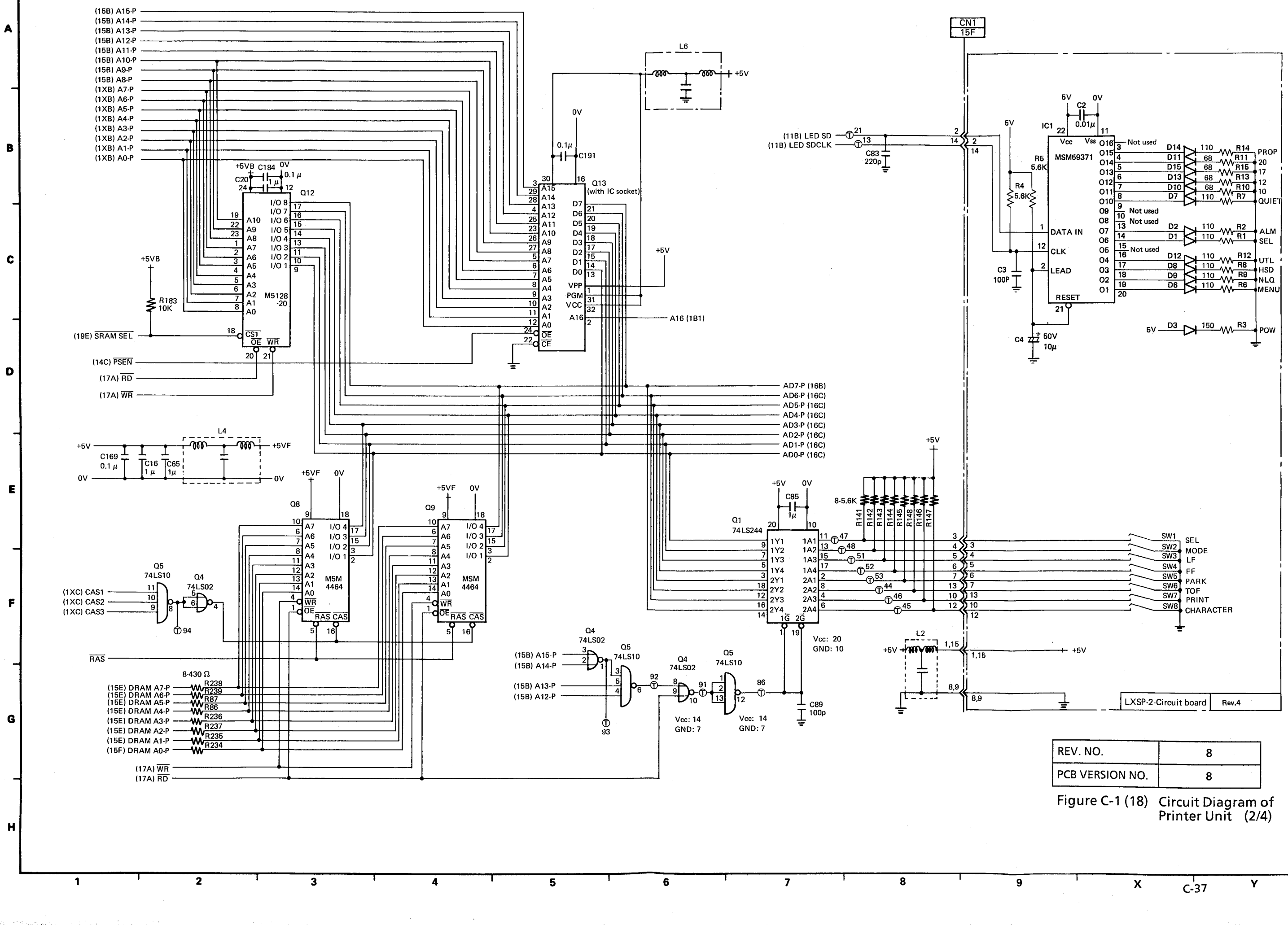
Figure C-1 (16) Circuit Diagram of Printer Unit (4/4)

	D-RAM ADDRESS
CAS1	4000 ~ 7FFF
CAS2	8000 ~ BFFF
CAS3	C000 ~ FFFF

*LSI address conversion required.

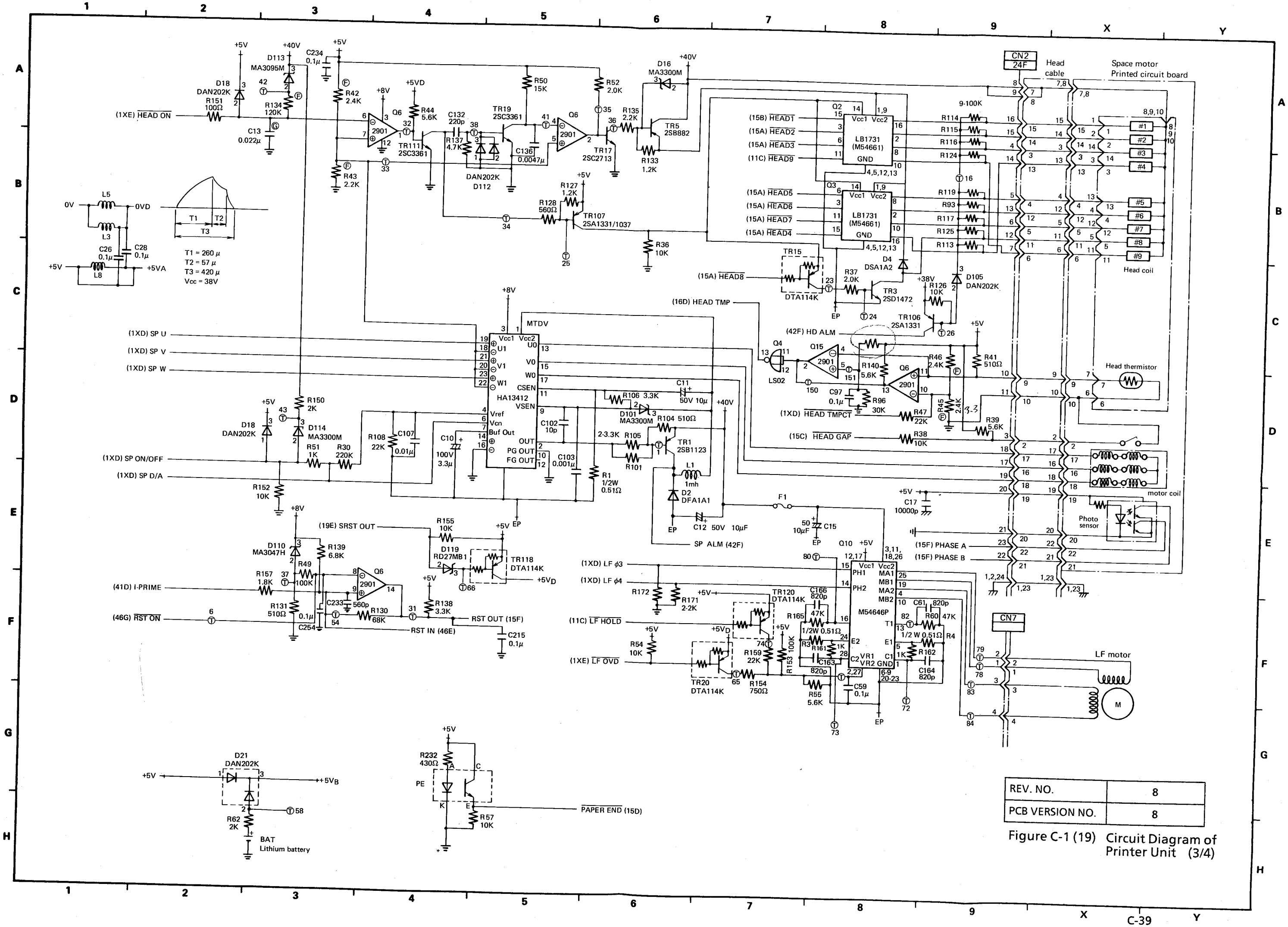
REV. NO.	8
PCB VERSION NO.	8

Figure C-1 (17) Circuit Diagram of Printer Unit (1/4)



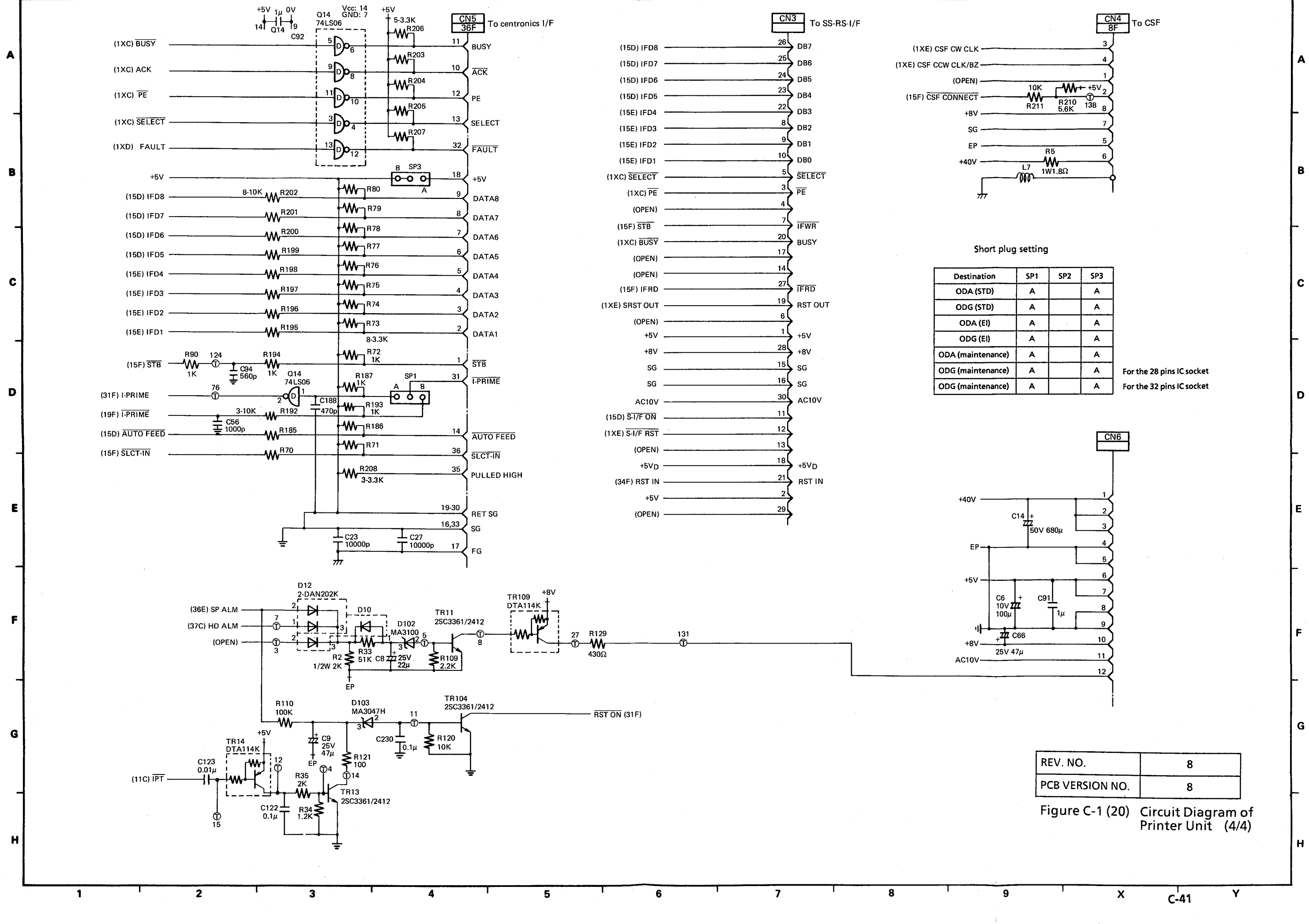
REV. NO.	8
PCB VERSION NO.	8

Figure C-1 (18) Circuit Diagram of Printer Unit (2/4)



REV. NO.	8
PCB VERSION NO.	8

Figure C-1 (19) Circuit Diagram of Printer Unit (3/4)

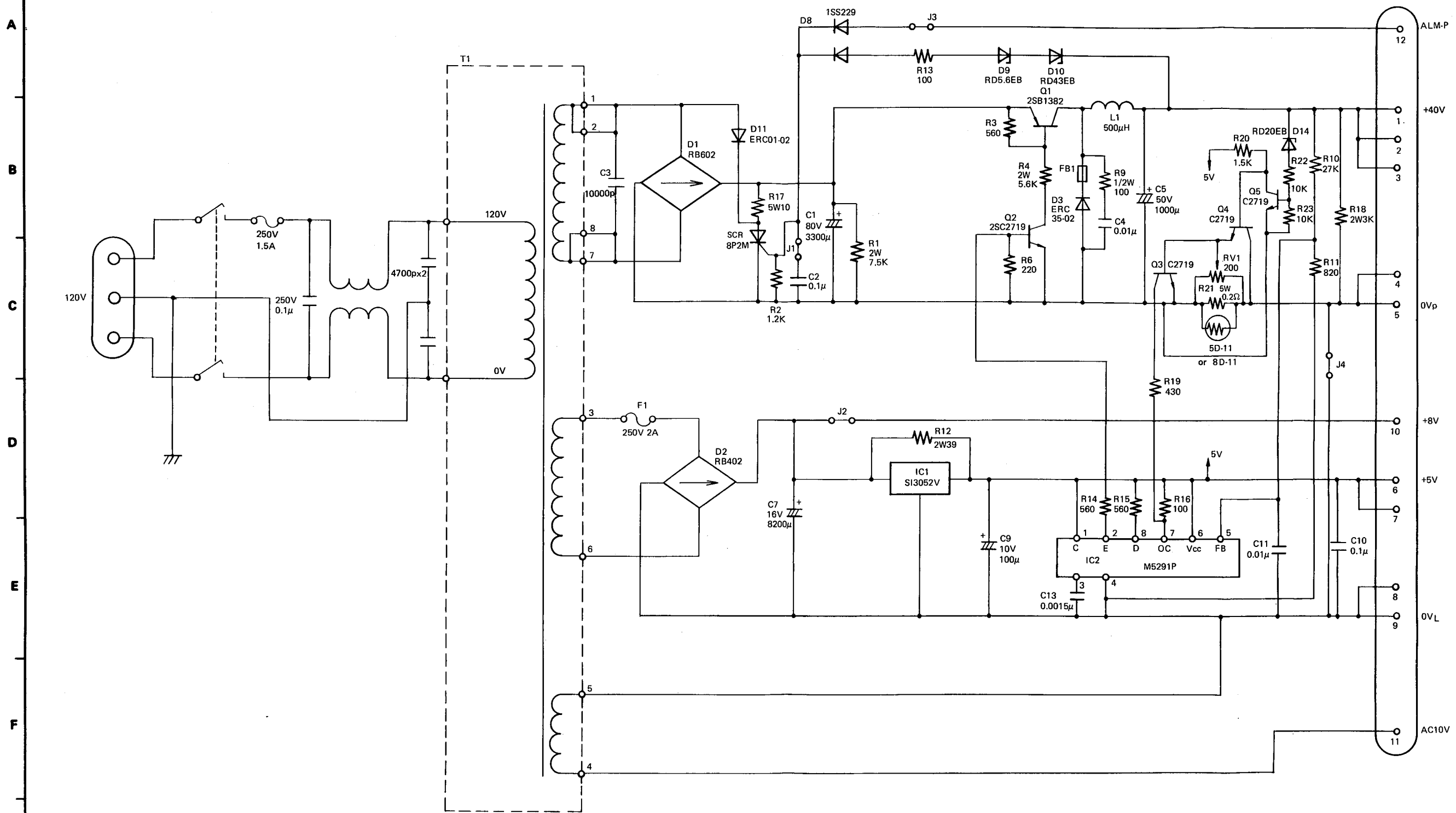


Short plug setting

Destination	SP1	SP2	SP3	
ODA (STD)	A		A	
ODG (STD)	A		A	
ODA (EI)	A		A	
ODG (EI)	A		A	
ODA (maintenance)	A		A	
ODG (maintenance)	A		A	For the 28 pins IC socket
ODG (maintenance)	A		A	For the 32 pins IC socket

REV. NO.	8
PCB VERSION NO.	8

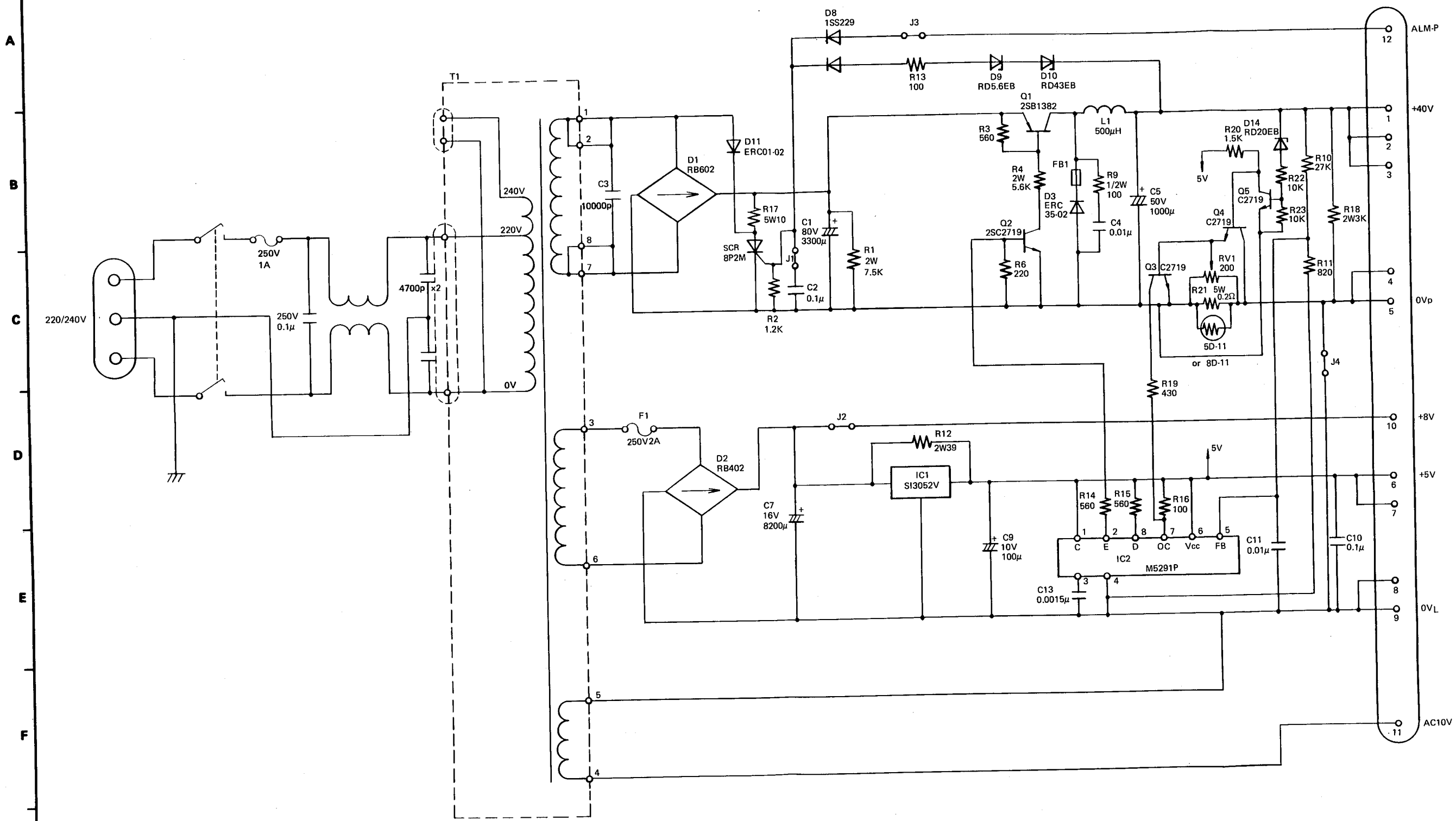
Figure C-1 (20) Circuit Diagram of Printer Unit (4/4)



[Note] PAII-2 PCB (version 1) is used as a secondary power PCB.

REV. NO.	2
PCB VERSION NO.	4, 7, 8

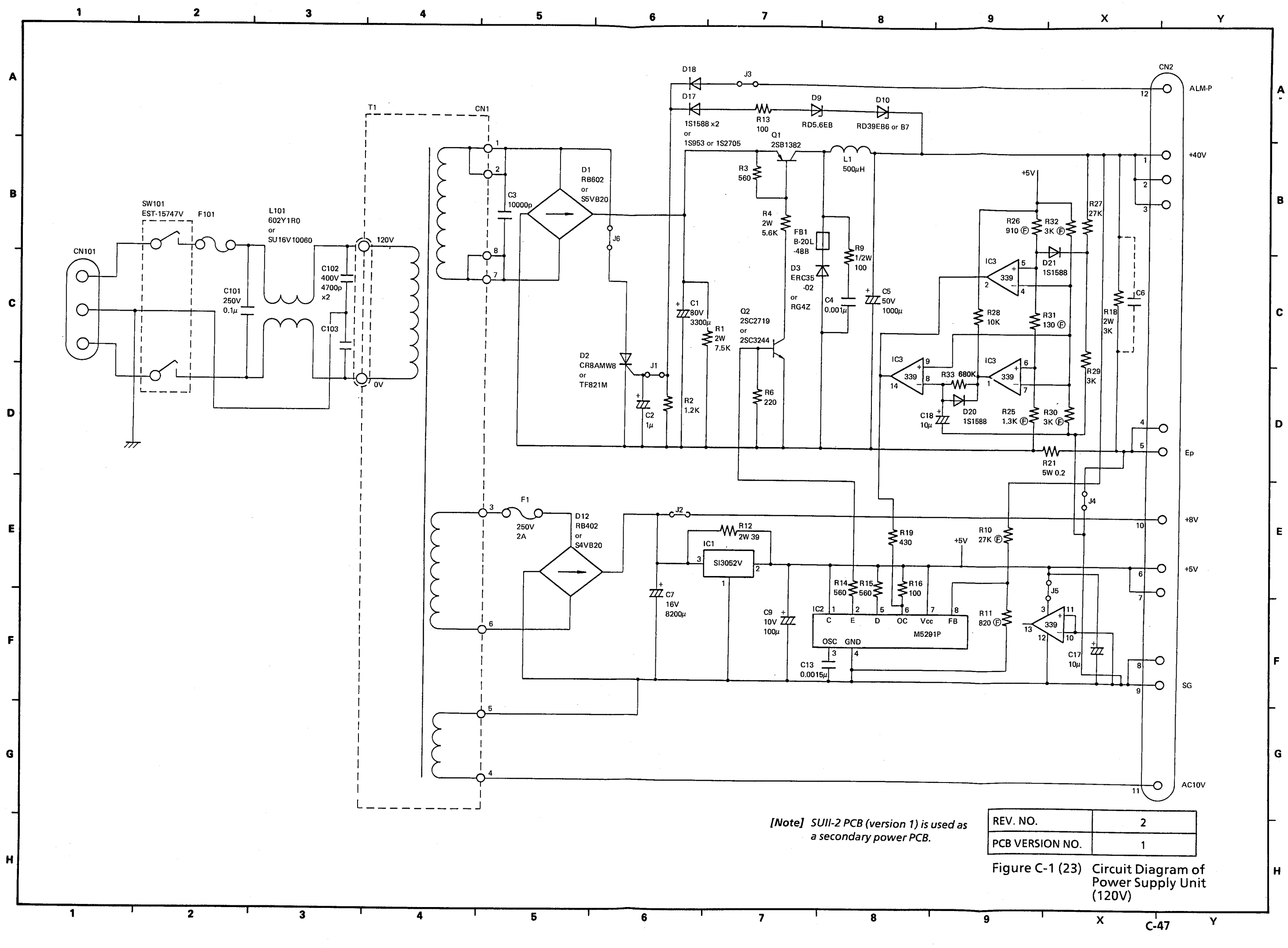
Figure C-1 (21) Circuit Diagram of Power Supply Unit (120V)



[Note] PAII-2 PCB (version 1) is used as a secondary power PCB.

REV. NO.	2
PCB VERSION NO.	4, 7, 8

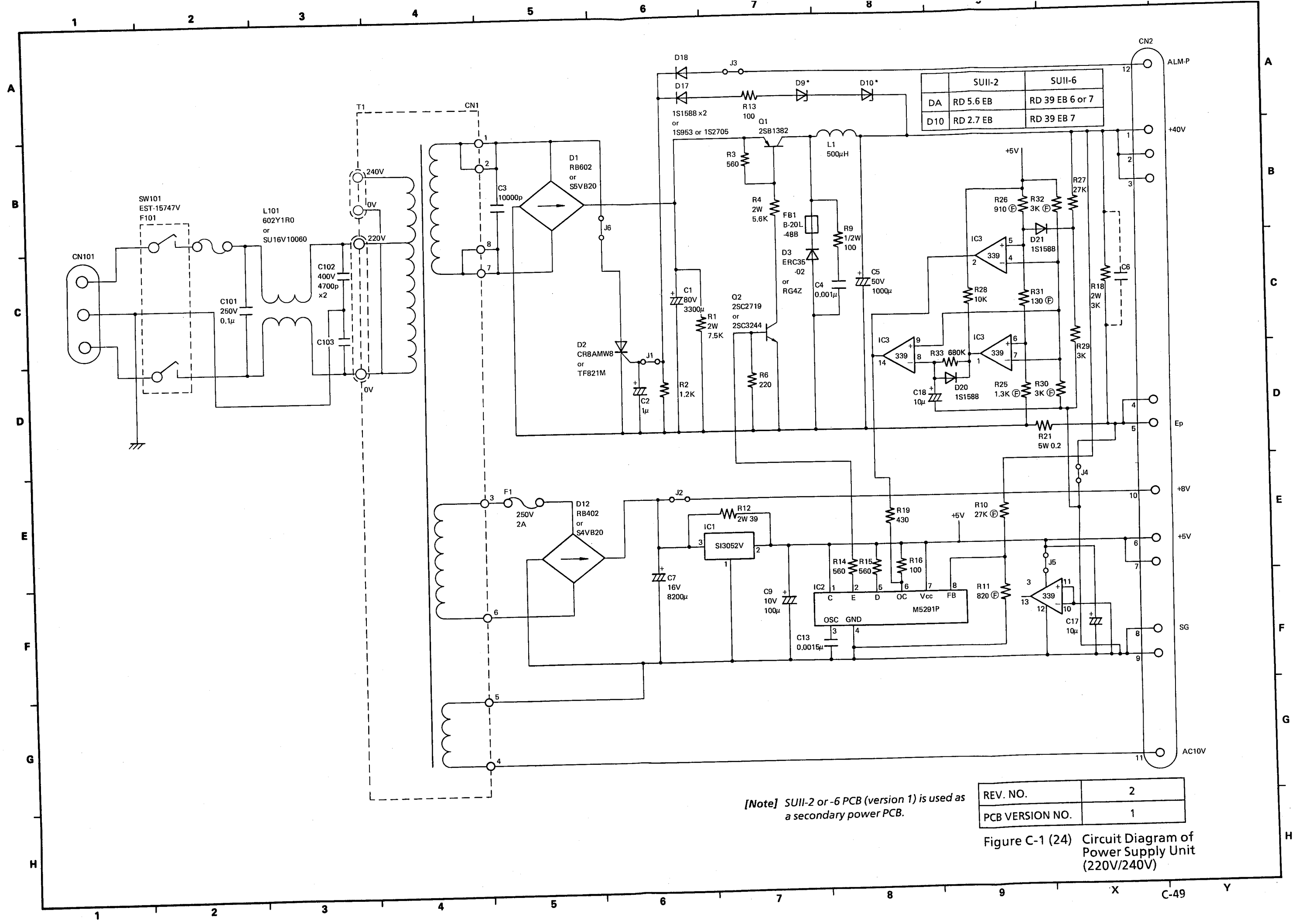
Figure C-1 (22) Circuit Diagram of Power Supply Unit (220V/240V)



[Note] *SUII-2 PCB (version 1) is used as a secondary power PCB.*

REV. NO.	2
PCB VERSION NO.	1

Figure C-1 (23) Circuit Diagram of Power Supply Unit (120V)



	SUII-2	SUII-6
DA	RD 5.6 EB	RD 39 EB 6 or 7
D10	RD 2.7 EB	RD 39 EB 7

[Note] *SUII-2 or -6 PCB (version 1) is used as a secondary power PCB.*

REV. NO.	2
PCB VERSION NO.	1

Figure C-1 (24) Circuit Diagram of Power Supply Unit (220V/240V)

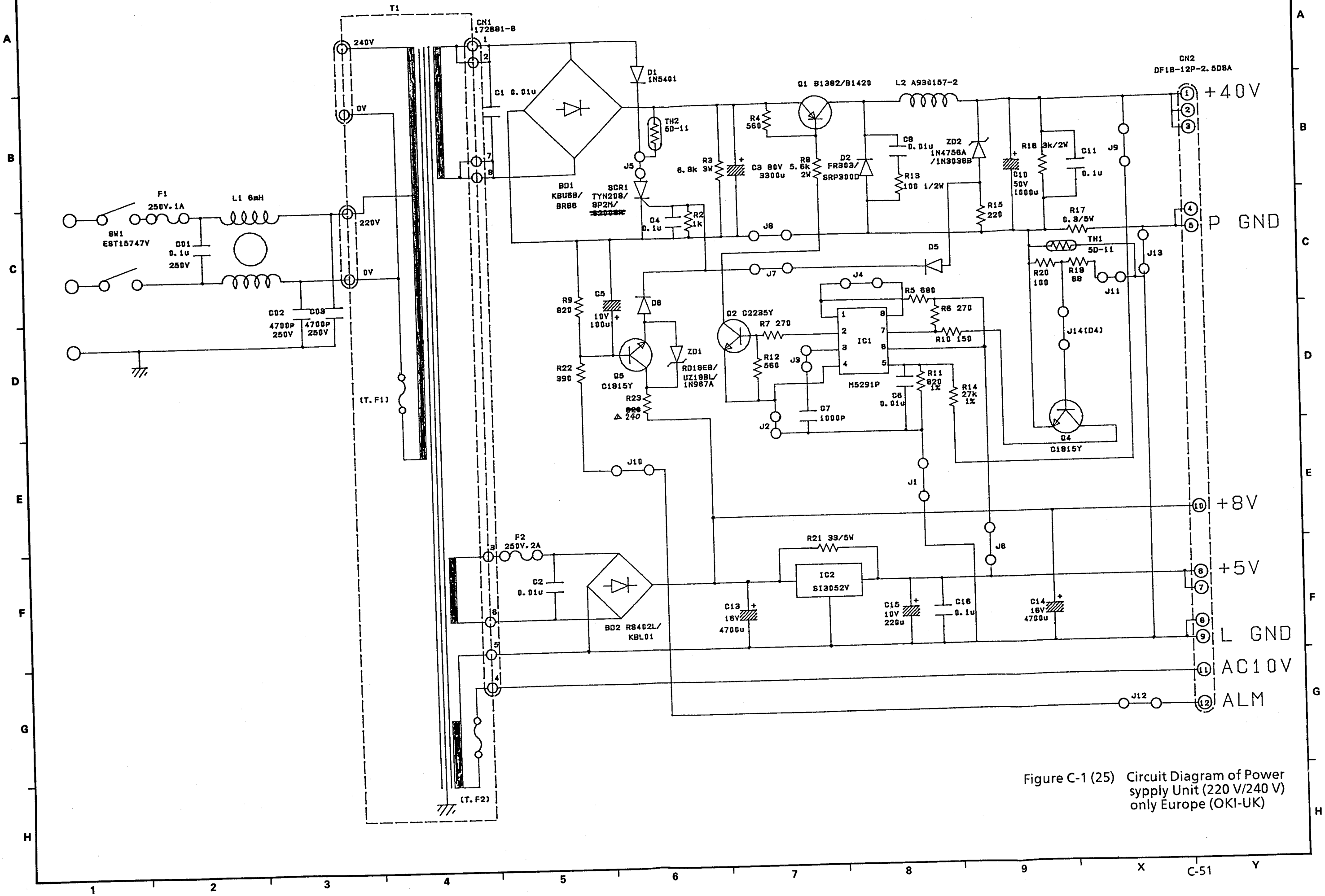
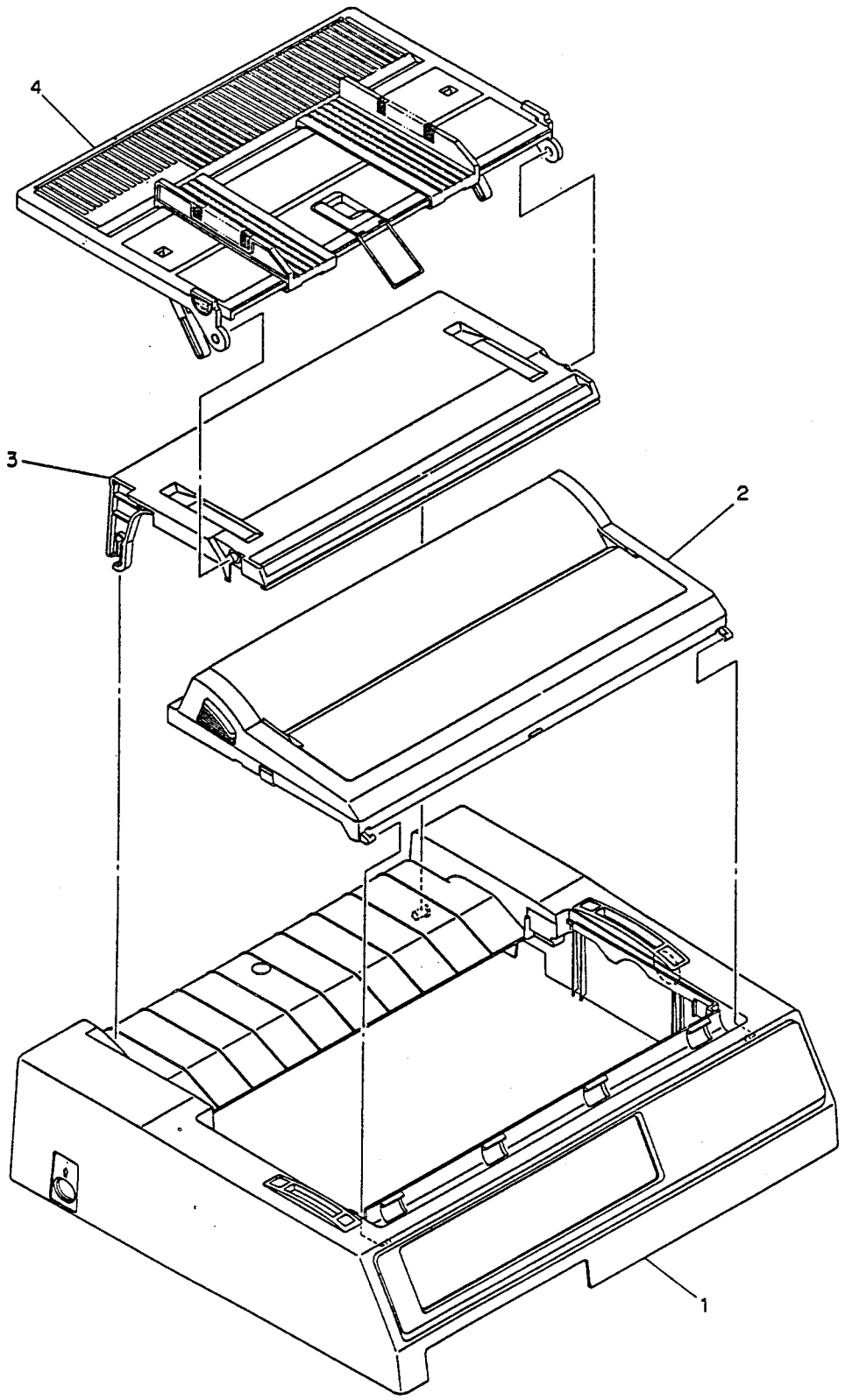


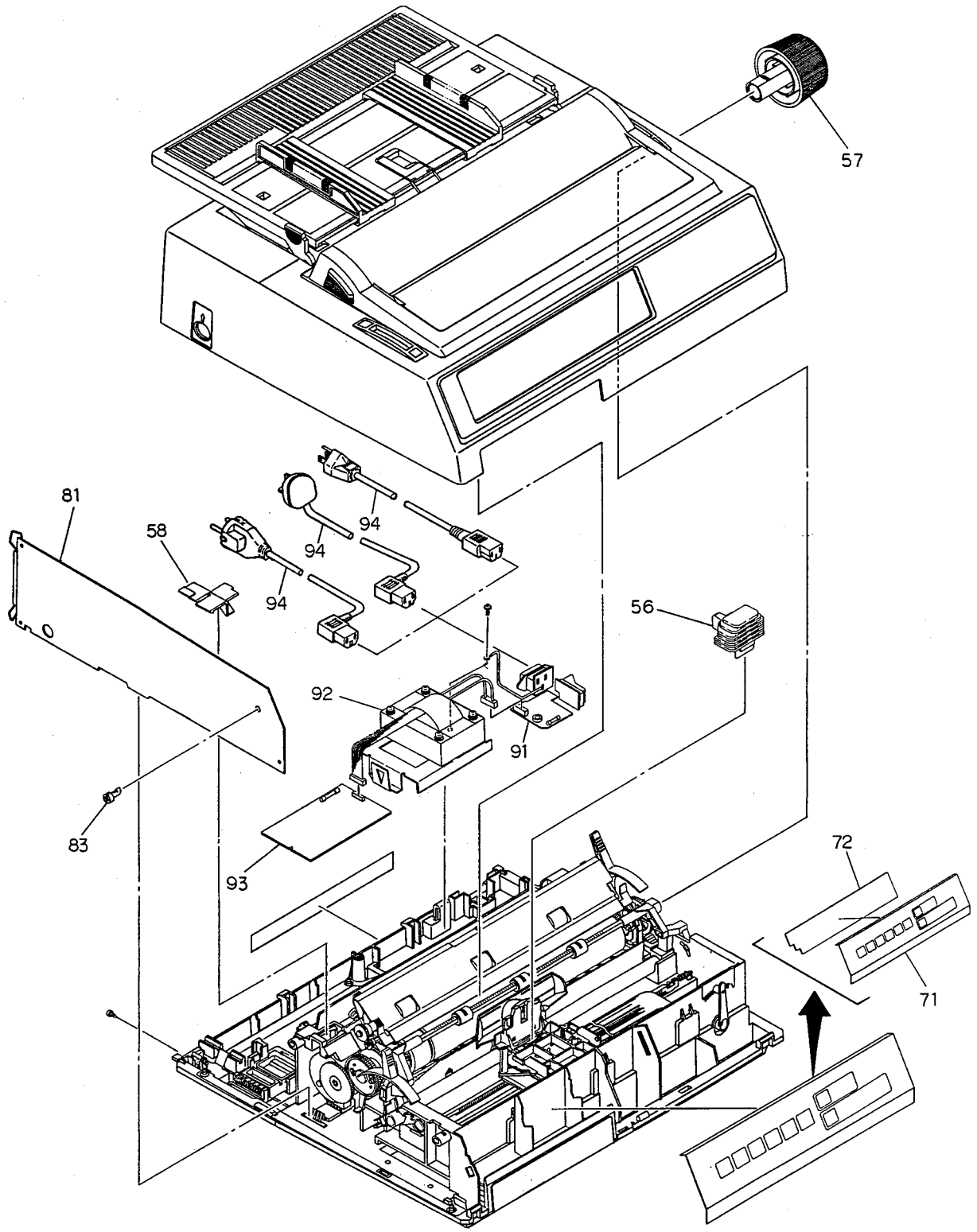
Figure C-1 (25) Circuit Diagram of Power sypply Unit (220 V/240 V) only Europe (OKI-UK)

APPENDIX D SPARE PARTS LIST

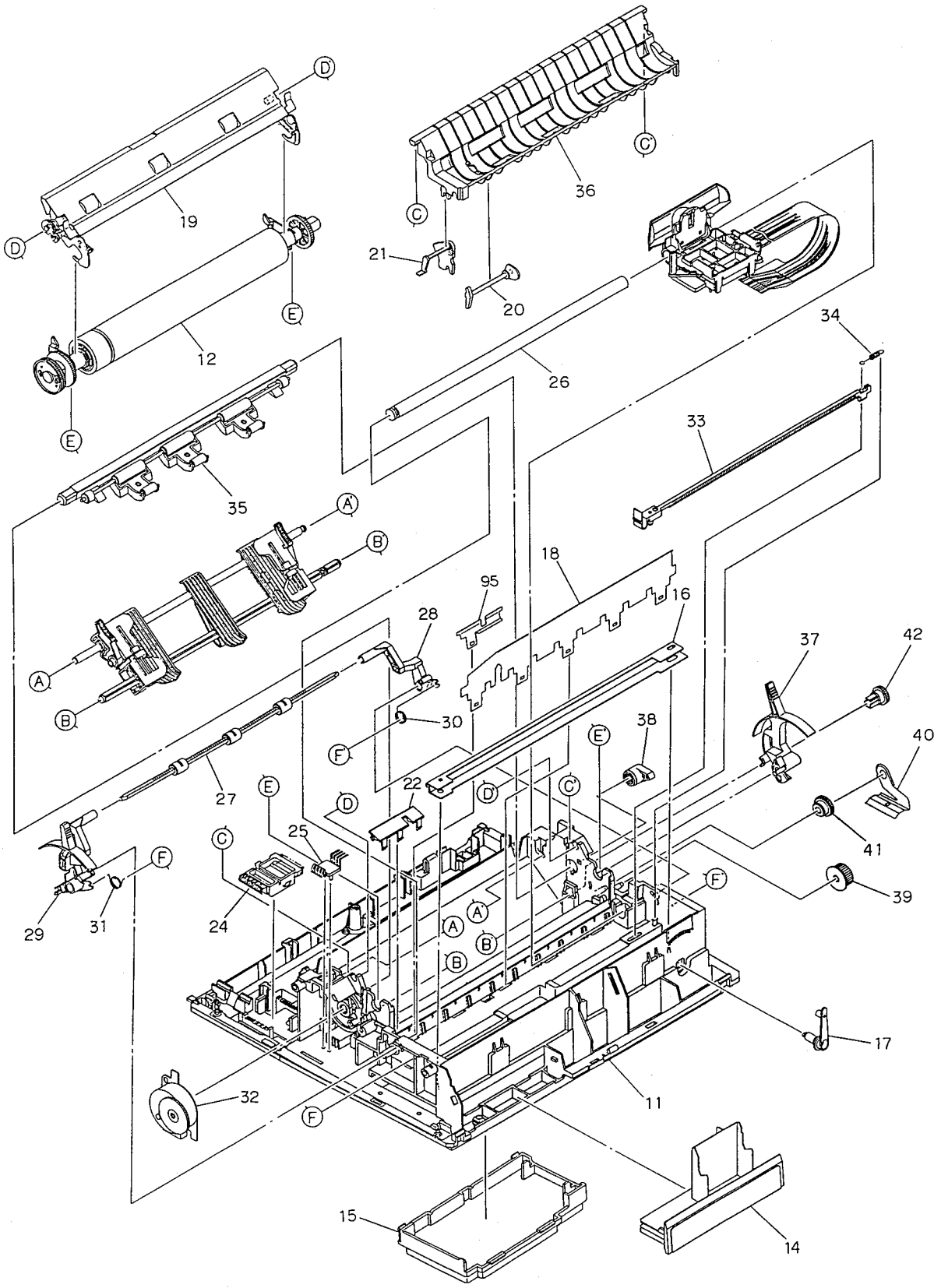
Quantity of spare parts	:	Indicates the quantity necessary to maintain the units for one year.
Condition	:	Number of units = 500 To be operated 2 hours/day 600 hours/year



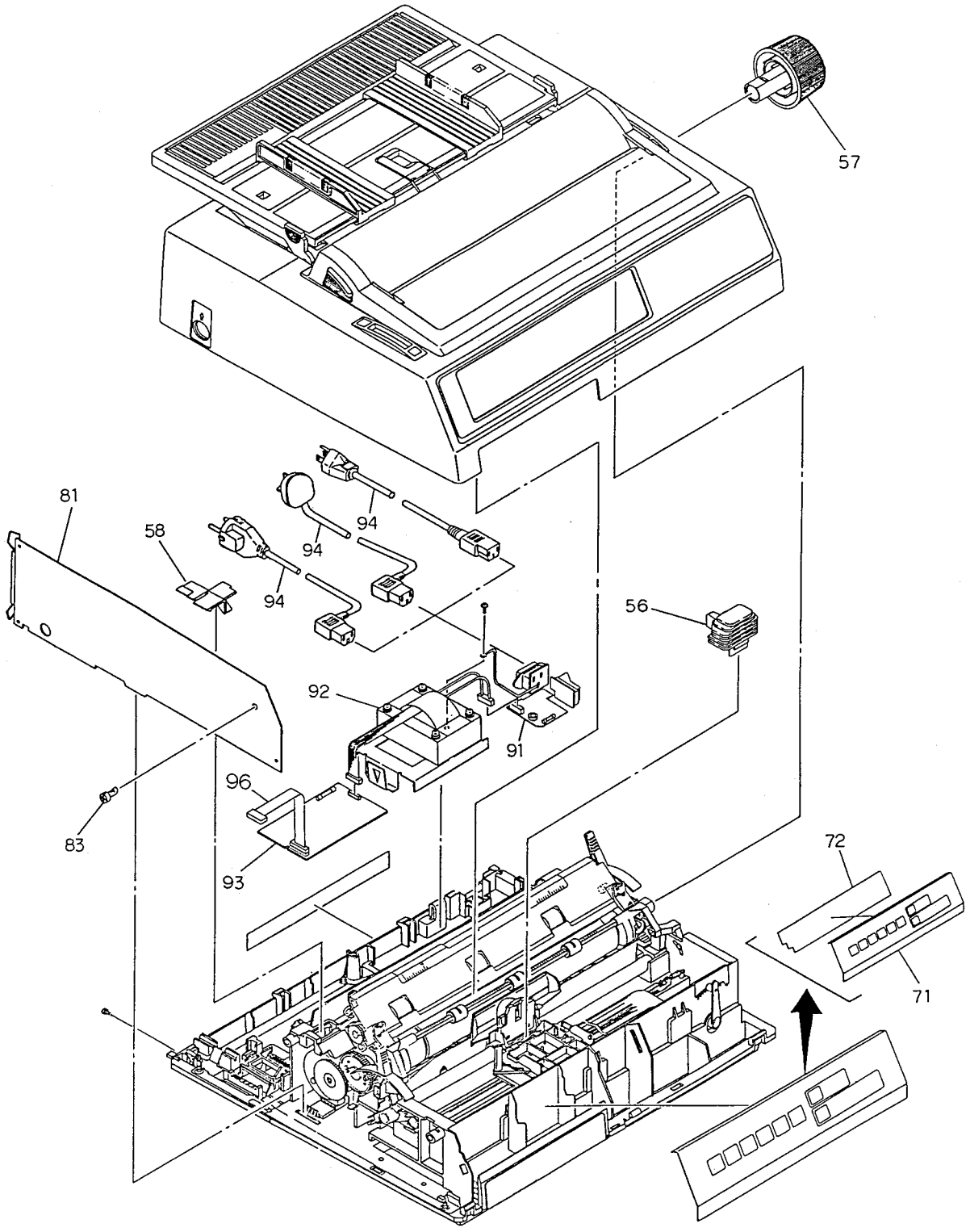
Printer unit (1/5)



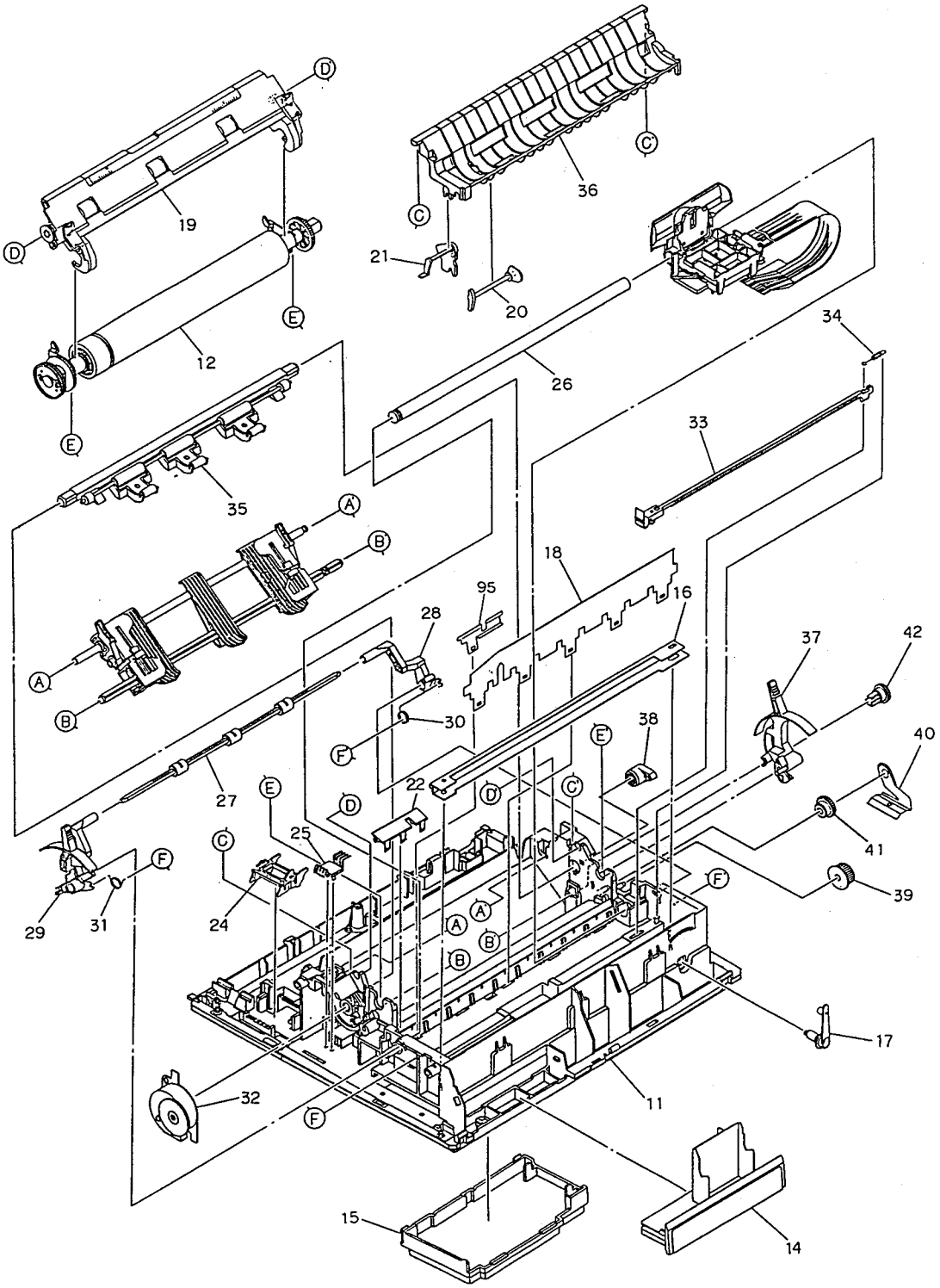
Printer unit (2/5)



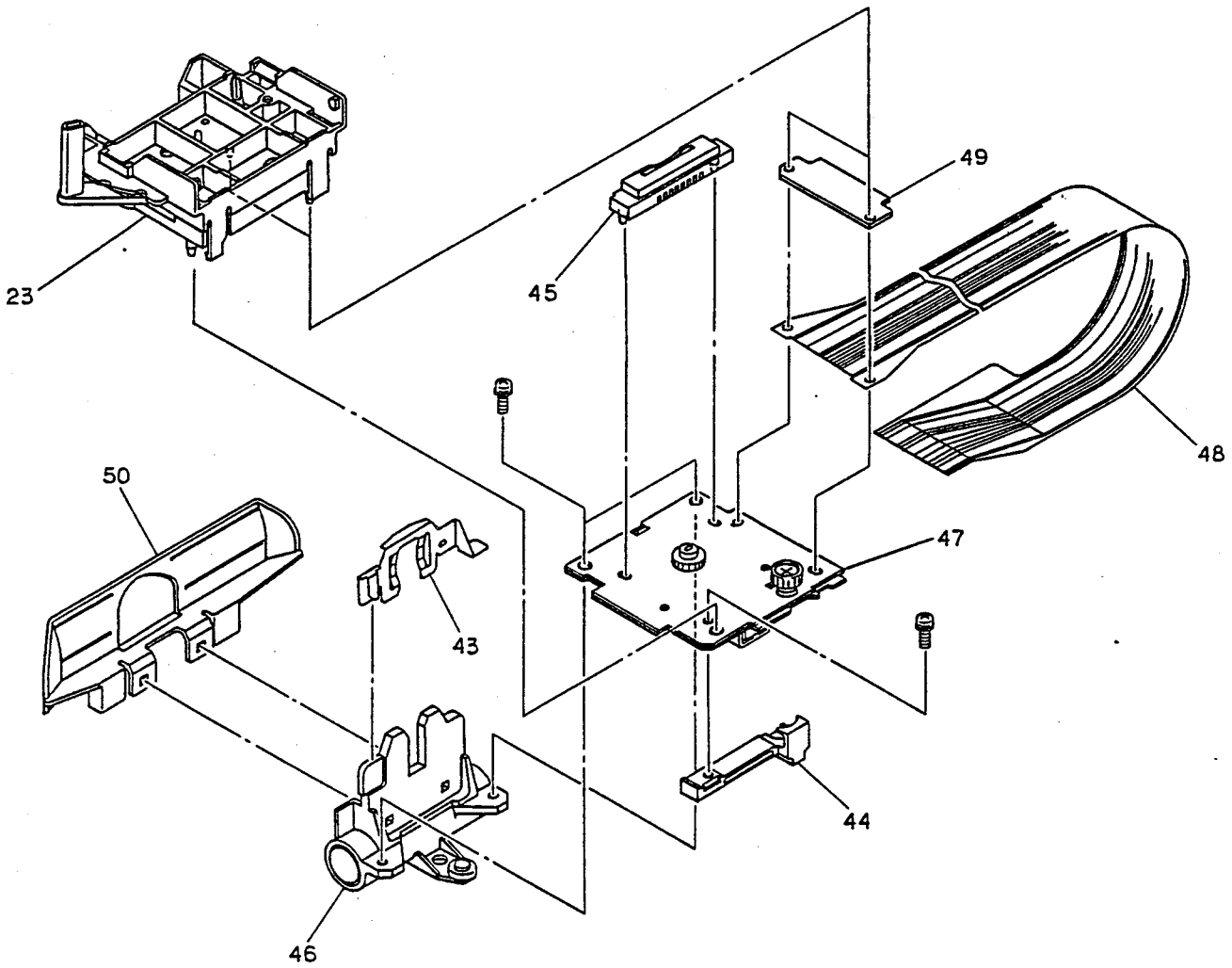
Printer unit (3/5)



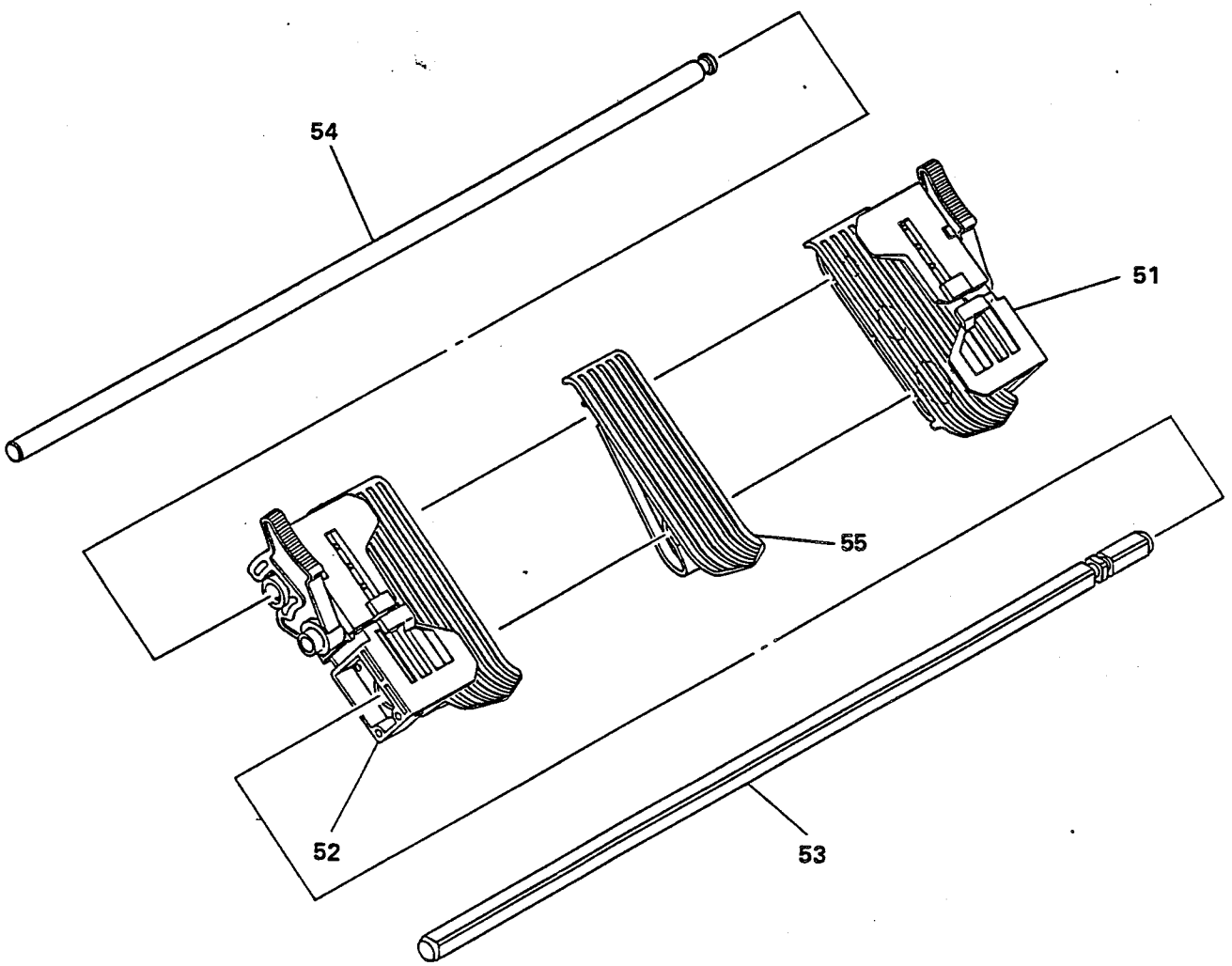
Printer unit (2/5)



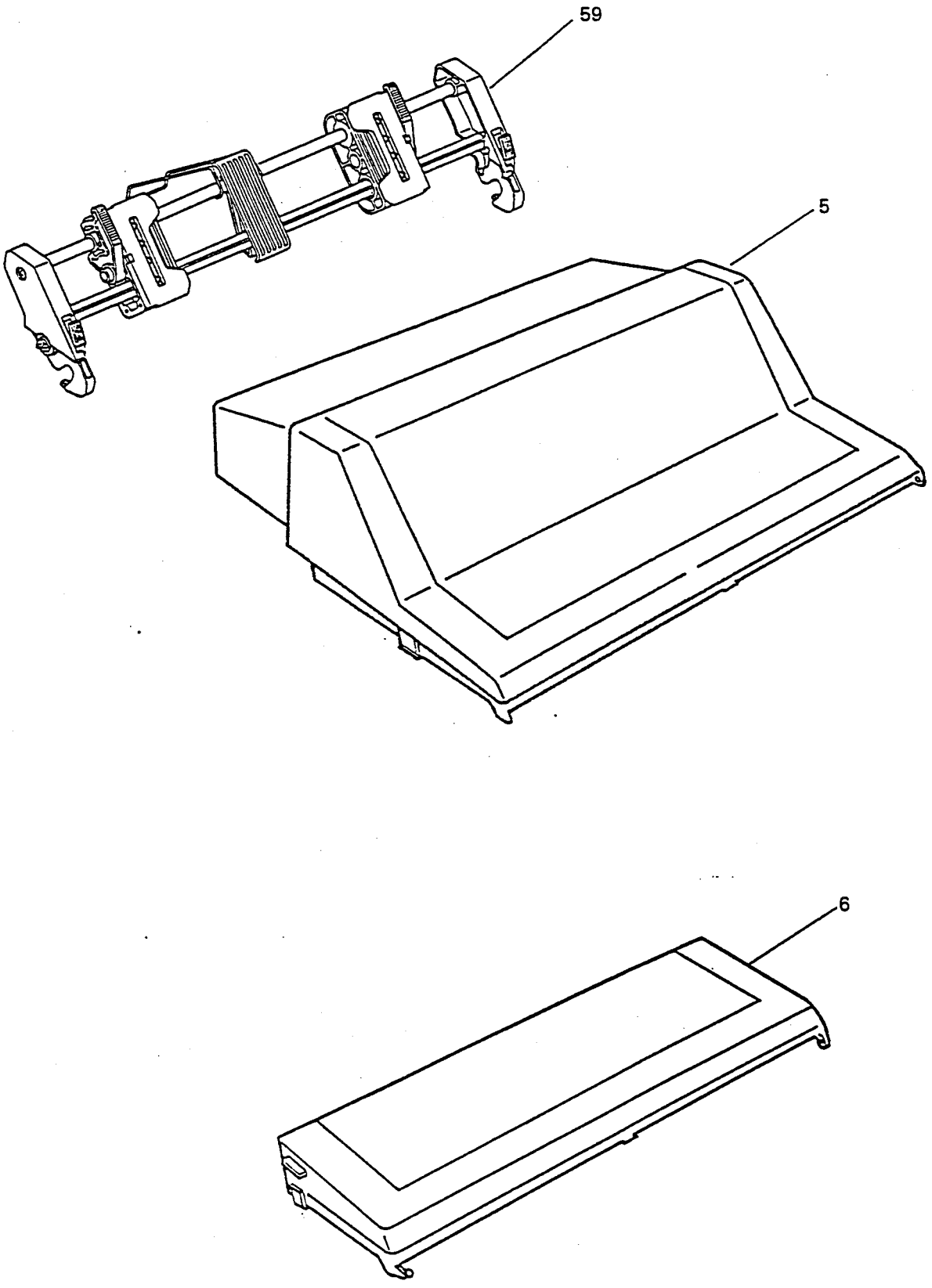
Printer unit (3/5)



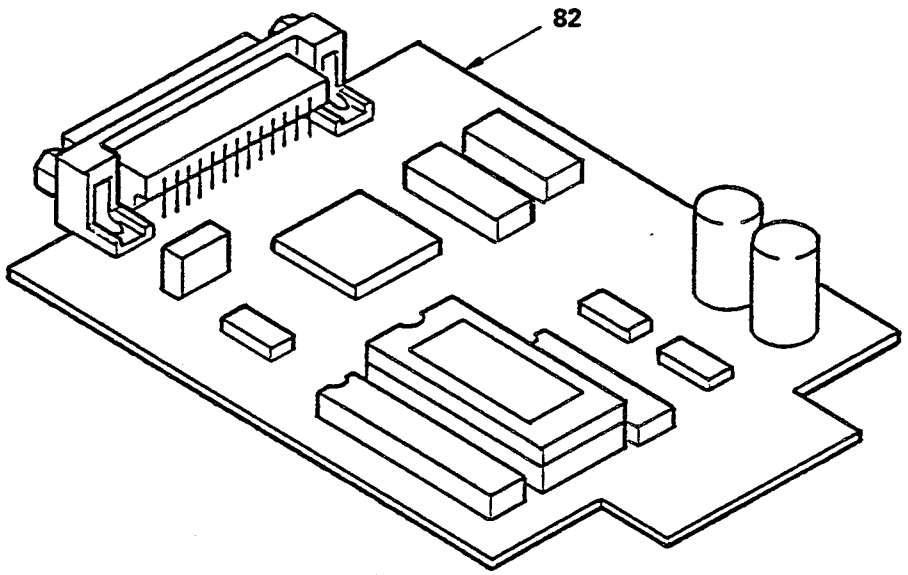
Printer unit (4/5)



Printer unit (5/5)



Option parts (1/2)



Option parts (2/2)

Spare parts list (1/5)

No.	Item No.	Item name	Q'ty	Q'ty of spare parts/year 500	Remarks/ODA P/N
	(Cover parts)				
1	1PP4016-6557P2	Middle cover	1	3	320 (ODA) 53488302
	1PP4016-6558P2	Midlle cover	1	3	321 (ODA) 53488402
	1PP4016-6557P5	Middle cover	1	3	320 (ODG)
	1PP4016-6558P5	Midlle cover	1	3	321 (ODG)
2	2PA4016-6559G1	Access cover assembly	1	3	320 50060701
	2PA4016-6560G1	Access cover assembly	1	3	321 50060801
3	1PP4016-6567P1	Rear cover frame	1	3	320 53488501
	1PP4016-6568P1	Rear cover frame	1	3	321 53488601
4	1PA4016-6569G1	Sheet separator assembly	1	3	320 50060901
	1PA4016-6570G1	Sheet separator assembly	1	3	321 50061001
5	2PP4016-6865G1	Acoustic cover (Tractor)	1	3	320 option 53493201
	2PP4016-6866G1	Acoustic cover (Tractor)	1	3	321 option 53494201
6	2PP4016-6867G1	Acoustic cover (CSF)	1	3	320 option 53494301
	2PP4016-6868G1	Acoustic cover (CSF)	1	3	321 option 53494401
	(Printer mechanism)				
11	3PA4025-2802G1	Main frame assembly	1	3	320 50061101
	3PA4025-2902G1	Main frame assembly	1	3	321 50061201
12	3PA4025-2811G1	Platen assembly	1	3	320 50061301
	3PA4025-2811G2	Platen assembly	1	3	321 50061302
13					
14	2PP4025-2952P1	Support panel A	1	1	53494901
15	3PA4025-2806G1	Board supporting cover assembly	1	3	50062301
16	3PP4025-2809P1	Guide rail	1	1	320 51002101
	3PP4025-2809P2	Guide rail	1	1	321 51002102
17	4PP4025-2810P1	Adjusting cam	1	3	51216201

Spare parts list (2/5)

No.	Item No.	Item name	Q'ty	Q'ty of spare parts/year	Remarks/ODA P/N	
				500		
18	3PP4025-2819P1	Leaf spring	1	3	320	50911501
	3PP4025-2905P1	Leaf spring	1	3	321	50911601
19	2PA4025-2925G1	Ruler guide	1	3	320	53488701
	2PA4025-2926G1	Ruler guide	1	3	321	53488801
20	3PP4025-2825P1	Paper end lever (B)	1	3	320	53488901
	3PP4025-2825P2	Paper end lever (B)	1	3	321	53488902
21	3PP4025-2826P1	Sensor lever	1	3		53489001
22	3PP4025-2827P1	Sensor cover	1	3		53489101
23	4PA4025-2955G1	Ribbon drive gear assembly	1	3		50063701
24	3PB4025-2911P1	Power contact	1	3		53328301
25	3PP4025-2874P1	LF motor inter-connect module	1	3		53328401
26	4PP4025-2837P1	Carriage shaft	1	3	320	51109401
	4PP4025-2837P2	Carriage shaft	1	3	321	51109402
27	4PA4025-2838G1	Indicator assembly	1	3	320	50061501
	4PA4025-2838G2	Indicator assembly	1	3	321	50061502
28	2PP4025-2840P1	Bail arm (R)	1	3		53489201
29	3PP4025-2841P1	Bail arm (L)	1	3		53489301
30	4PB4025-2842P1	Bail arm spring (R)	1	5		50911701
31	4PB4025-2843P1	Bail arm spring (L)	1	5		50911801
32	3PB4025-2844P1	LF motor	1	5		56507001
33	3PP4025-2845P1	Space rack	1	5	320	53489401
	3PP4025-2845P2	Space rack	1	5	321	53489402
34	4PB4025-2873P1	Tension spring	1	3		50911901
35	3PA4025-2846G1	Pressure roller assembly	1	3	320	50061601
	3PA4025-2908G1	Pressure roller assembly	1	3	321	50061701

Spare parts list (3/5)

No.	Item No.	Item name	Q'ty	Q'ty of spare parts/year	Remarks/ODA P/N	
				500		
36	3PA4025-2853G1	Paper chute assembly	1	3	320	50061801
	3PA4025-2915G1	Paper chute assembly	1	3	321	50061901
37	3PP4025-2852P1	Release lever	1	3		53489501
38	4PP4025-2881P1	Release link	1	3		53489601
39	4PP4025-2866P1	Change gear	1	3		51215901
40	4PP4025-2867P1	Reset spring	1	3		50912001
41	4PP4025-2868P1	Idler gear	1	3		51216001
42	4PP4025-2869P1	Tractor gear	1	3		51216101
43	4PP4025-1048P1	Head clamp	1	3		50702901
44	4PB4025-1088P1	Slider	1	5		51001801
45	3PB4025-1116P1	Connector	1	3		56718601
46	4PB4025-2829G1	Carriage frame set	1	3		53490401
47	4YX4025-1800G2	Space motor assembly	1	5		56507202
48	2PU4007-1096P1	Flexible cable	1	10	320	56616301
	2PU4007-1096P2	Flexible cable	1	10	321	56616302
49	4PP4025-2960P1	Contact pressure rubber	1	3		51706501
50	3PP4025-2836P1	Ribbon protector	1	5		53056201
51	4PA4025-2855G1	Tractor frame assembly (R)	1	3		50062001
52	4PA4025-2861G1	Tractor frame assembly (L)	1	3		50062101
53	4PP4025-2864P1	Drive shaft	1	1	320	51109501
	4PP4025-2864P2	Drive shaft	1	1	321	51109502
54	4PP4025-2831P1	Lock shaft	1	1	320	51109601
	4PP4025-2831P2	Lock shaft	1	1	321	51109602
55	3PP4025-2927P1	Sheet guide	1	3		51002201

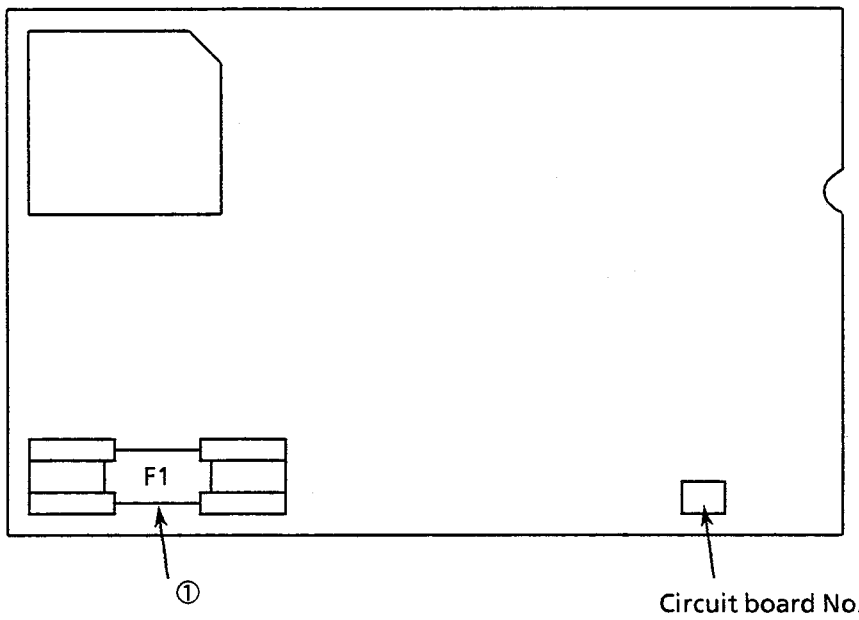
Spare parts list (4/5)

No.	Item No.	Item name	Q'ty	Q'ty of spare parts/year	Remarks/ODA P/N
				500	
56	4YA4025-1401G2	Printhead	1	9	50063802
57	3PP4025-2871P1	Platen knob	1	5	51901101
58	3PA4025-2896P1	Board lock	1	3	
59	3PA4025-2971G1	Tractor unit (N)	1	3	320 option
	3PA4025-2971G2	Tractor unit (W)	1	3	321 option
	(Operator panel)				
71	3PP4025-3114G3	Operator panel	1	3	53490101
72	4YA4021-1048G2	LXSP-2 printed circuit board	1	3	55038602
	(Printed circuit board)				
81	4YA4021-1051G106	LXMC-printed circuit board	1	3	ODA, 55041411 320/321 For maintenance (without ROMS)
	4YA4021-1051G204	LXMC-printed circuit board	1	3	ODG, 320/321 For maintenance (without ROMS, 28 pins IC socket)
	4YA4021-1051G205	LXMC-printed circuit board	1	3	ODG, 320/321 (without ROMS, 32 pins IC socket)
82	4YA4021-1050G002	LXHI-printed circuit board (RS-232C)	1	3	Option 55038901 (ODA)
	4YA4021-1050G003	LXHI-printed circuit board (RS-232C)	1	3	Option (ODG)
83	4PP4025-2870P1	Lock post	1	3	

Spare parts list (5/5)

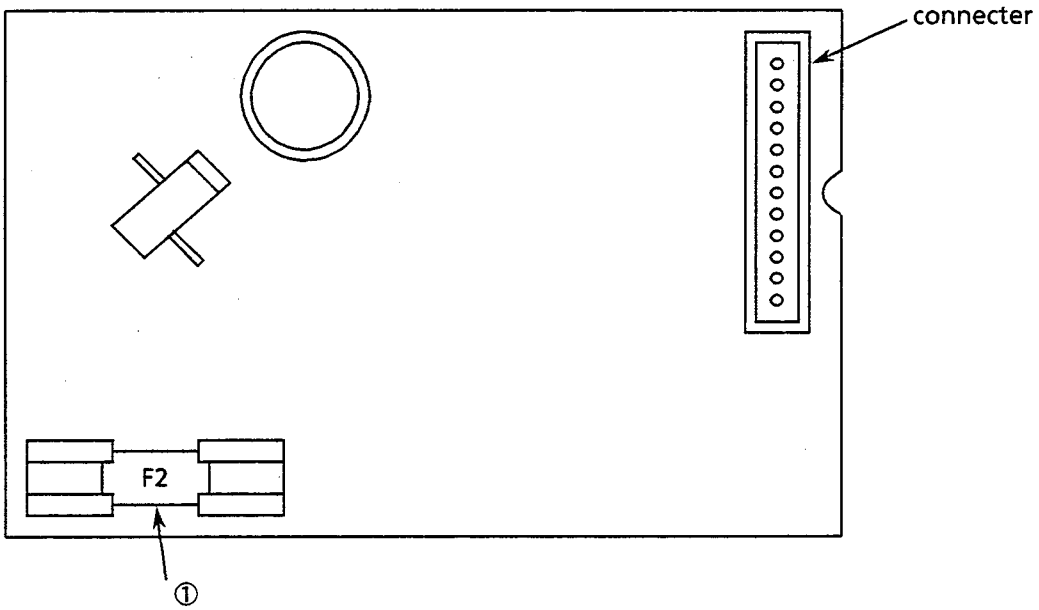
(For PCB version No. 8 and after)

No.	Item No.	Item name	Q'ty	Q'ty of spare parts/year 500	Remarks/ODA P/N	
	(Power supply assembly)					
91	4YX4056-3477G3	Filter assembly	1	3	120V	55503103
	4YX4056-3477G4	Filter assembly	1	3	220/240V	55503104
92	4YB4056-8293P1	Transformer	1	3	320 120V	56407501
	4YB4056-8349P1	Transformer	1	3	320 220/240V	56407401
	4YB4056-8293P2	Transformer	1	3	321 120V	56407502
	4YB4056-8349P2	Transformer	1	3	321 220/240V	56407402
93	3YU5057-3311G2	SUII-2 printed circuit board	1	3	320/321 only	
	3YU5057-3311G6	SUII-6 printed circuit board	1	3	320/321 220/240V only	
94	3YS4011-1026P1	AC cable	1	1	120V	56609701
	3YS4011-1052P1	AC cable	1	1	220V Continental	56610801
	3YS4011-1192P1	AC cable	1	1	240V British	56615301
	3YS4011-1103P1	AC cable	1	1	240V Oceanian	
95	3PP4025-3161P1	Support spring	1	3	321	
96	4YS4011-4311P2	(Connector cord)	1	1		
91'	4YB4049-1457P4	Filter board	1	3	220/240V	Only Europe (OKI-UK)
92'	4YB4049-1462P1	Transformer	1	3	320-220/240V	
	4YB4049-1462P2	Transformer	1	3	321-220/240V	
93'	4YB4049-1458P3	DC PSU board without connector	1	3	320/321	
	4YB4049-1458P7	DC PSU board with connector	1	3	320/321	
94'	3YS4011-1172P1	AC cable	1	1	220V Continental	
	3YS4011-1173P1	AC cable	1	1	240V British	



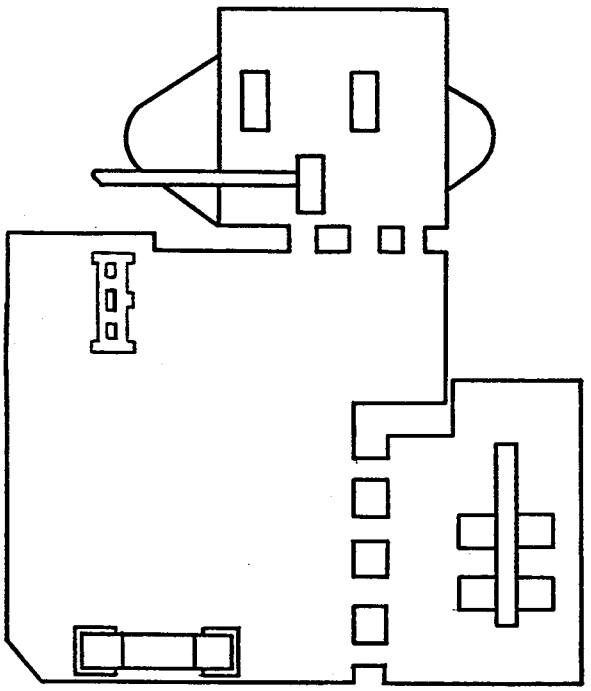
Item No.	Part NO.	Description	Qty	Remarks/ODA P/N
1	540A2052M2202	Fuse 2A	1	56302101

Figure D-1 PAII or SUII printed-circuit board (1/1)



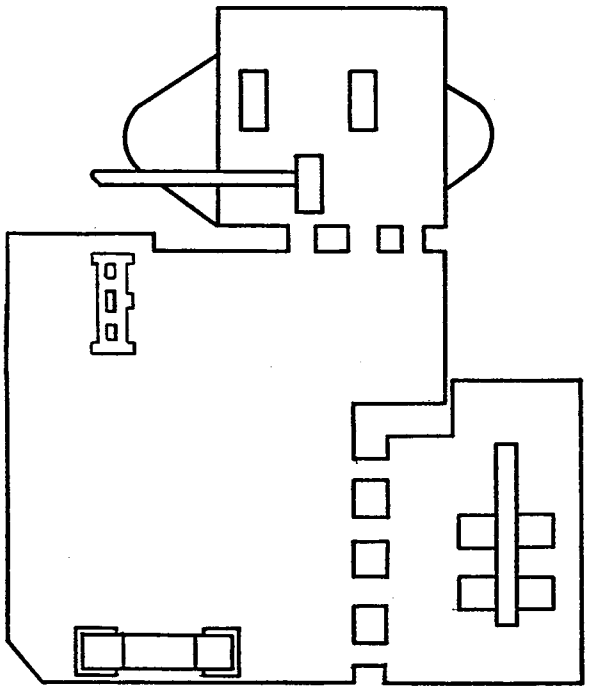
Item No.	Part NO.	Description	Qty	Remarks
1	4YB4049-1566P1	Fuse 2A	1	

Figure D-1 DC PSU board for only Europe (OKI-UK) (1/1)



Item No.	Part NO.	Description	Qty	Remarks/ODA P/N
1	540A2052M2152	Fuse 1.5A	1	120V 56303402
1	FP-21093	Fuse 1.0A	1	220/240V, miniature 56302502

Figure D-2 Filter board (1/1)



Item No.	Part NO.	Description	Qty	Remarks
1	4YB4049-1564P1	Fuse 1.0A	1	220/240V, miniature

Figure D-2 Filter board for only Europe (OKI-UK) (1/1)

APPENDIX E SUPER SPEED RS-232C (for ML390/391/320/321) SERIAL INTERFACE BOARD MAINTENANCE

1. GENERAL

This section describes the super speed RS-232C Serial Interface board installed in the Microline 390/391/320/321 as an option using a start-stop serial communications circuit. This serial interface board is capable of transmitting and receiving simultaneously at speeds up to 19,200 bits per second. Two protocols are available: printer Ready/Busy and X-ON/X-OFF modes.

2. OPERATION DESCRIPTION

2.1 Element Description

(1) 80C51

An eight-bit microprocessor controller that controls the following:

(a.) Serial interface protocol and transfer of data through a serial port.

(b.) Message buffer.

(c.) Transmission of parallel data to the printer.

(2) SN75154

An RS-232C standard line receiver.

(3) SN75188

An RS-232C standard line driver.

(4) 2764

An 8 kbyte ROM that contains the serial interface control program.

(5) HM6264

An 8192-byte static RAM used as a message buffer.

2.2 Circuit Description

A block diagram is shown in Figure E-2-1.

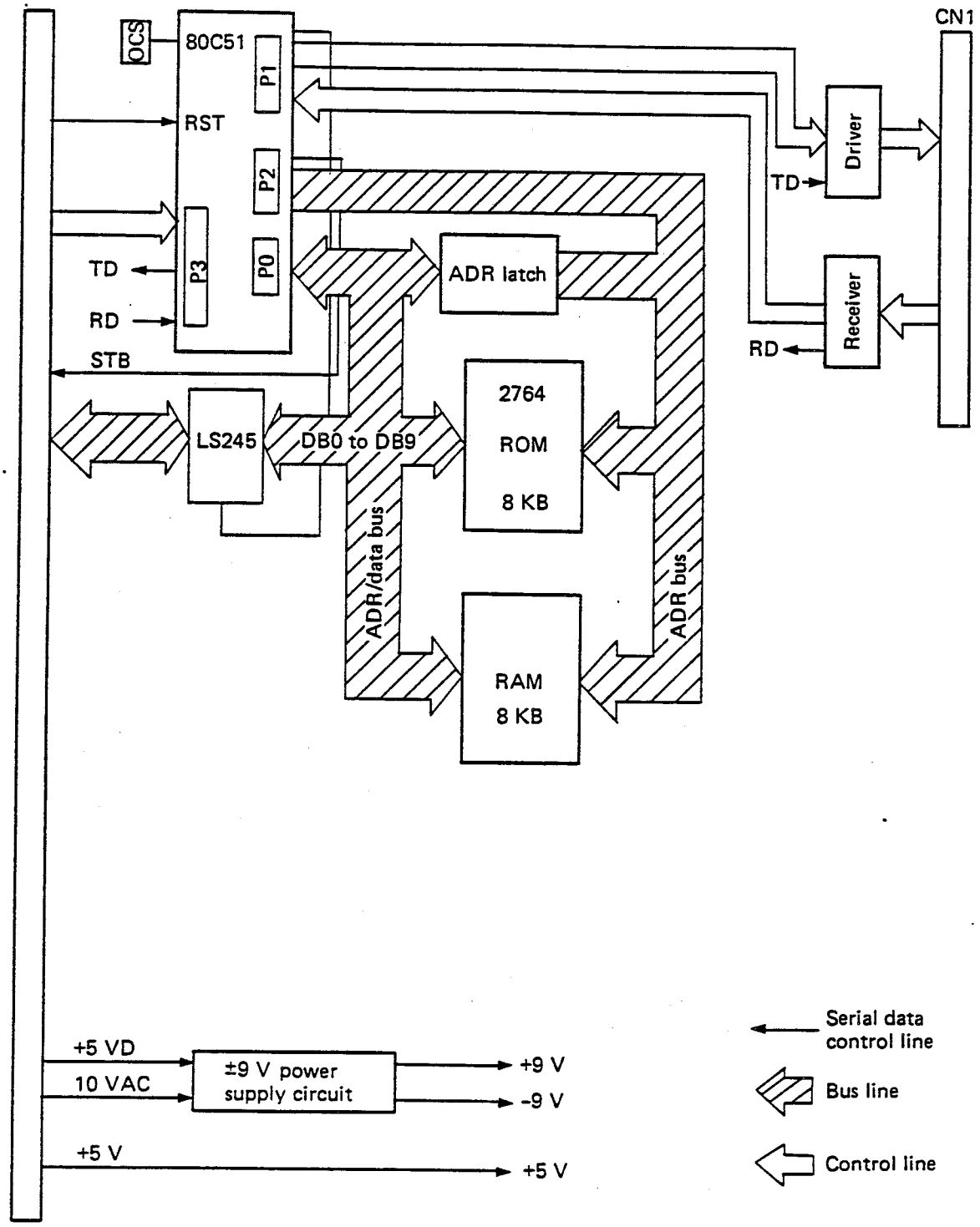


Figure E-2-1 Block diagram

2.2.1 Operation at power on

After power is turned on, an RST OUT signal is sent from the printer control board which resets the printer. When the reset is canpleted, the 80C51 CPU performs initialization. Initialization consists of setting the menu, setting the 80C51 timer, and setting the serial mode.

2.2.2 RS-232C interface

The DTR, SSD, TD and RTS signals output by the 80C51 are converted to RS-232C signals by line driver SN75188 (Q1) and sent to the host.

In addition, signals DSR, CTS, CD, and RD on the RS-232C interface are converted to TTL level by line receiver SN75154 (Q2) and input to the 80C51.

2.3 Communication Procedure Flowchart

2.3.1 Mode ⓐ

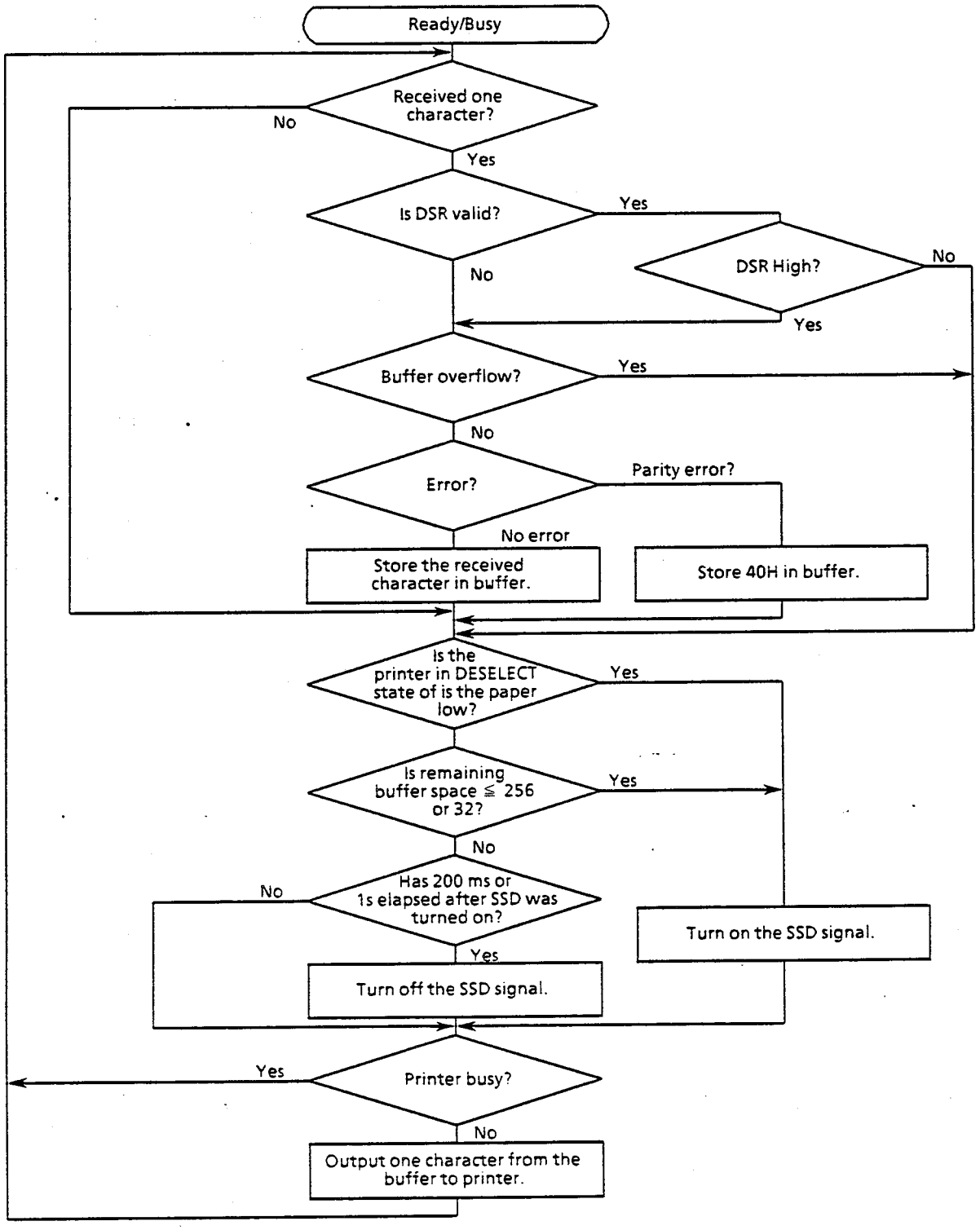


Figure E-2

2.3.2 Mode ⓑ

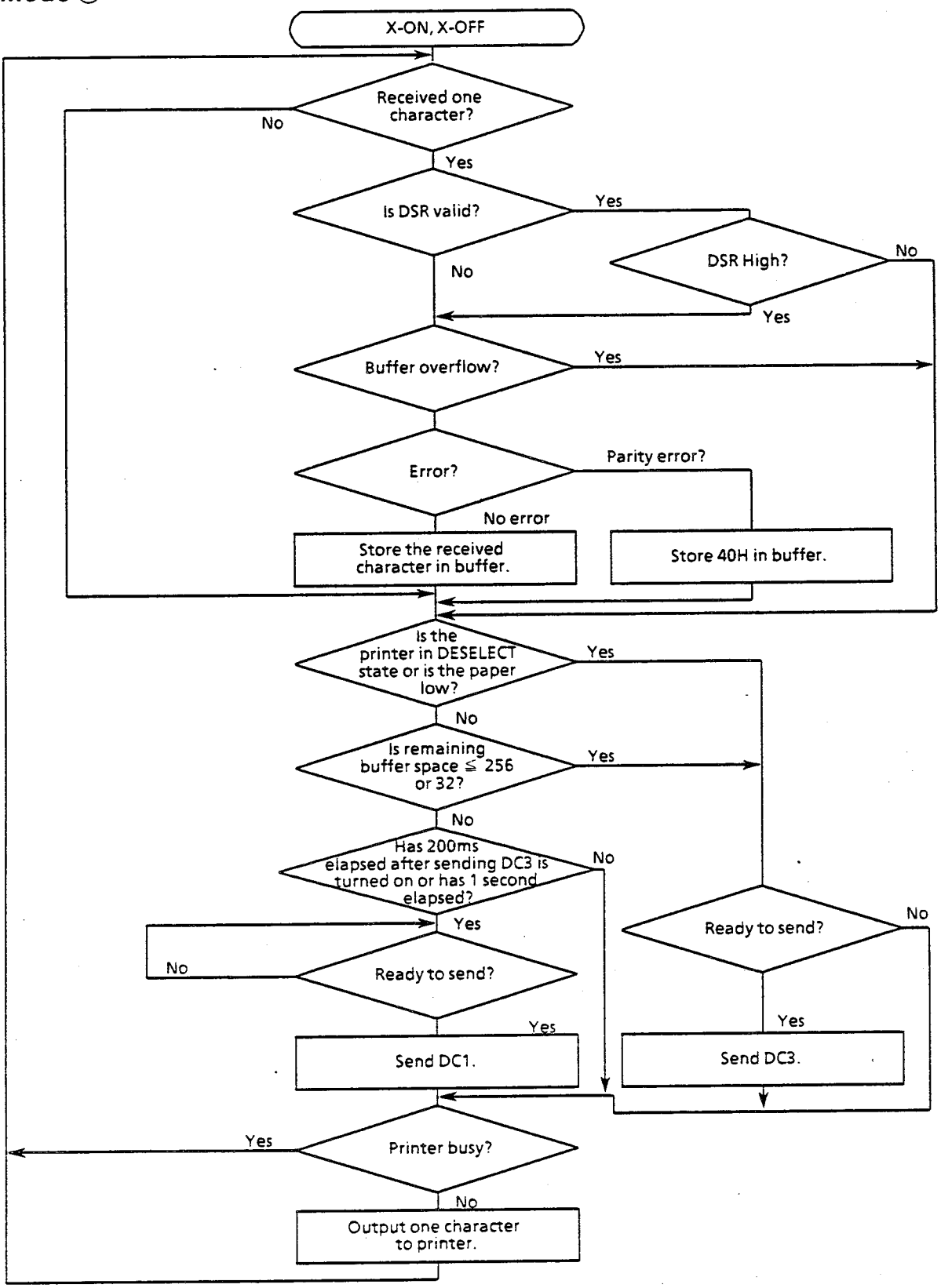


Figure E-3

3. TROUBLESHOOTING FLOWCHART

3.1 Before Repairing a Fault

If possible ask and record under what situation the trouble occurred.

Before troubleshooting, set up the printer to operate under the same conditions as those at the time of the trouble occurrence to see if the same trouble occurs again. If not, perform the self-test and thoroughly test the printers functionality.

3.2 Troubleshooting

(1) Data cannot be received through the serial interface.

(2) In serial interface reception, some print data is skipped or the printer does not operate.

① Data cannot be received through the serial interface.
(Protocol is READY/BUSY state, BUSY LINE is SSD + .)

- Is the waveform of OSC as shown in Figure E-3-1?

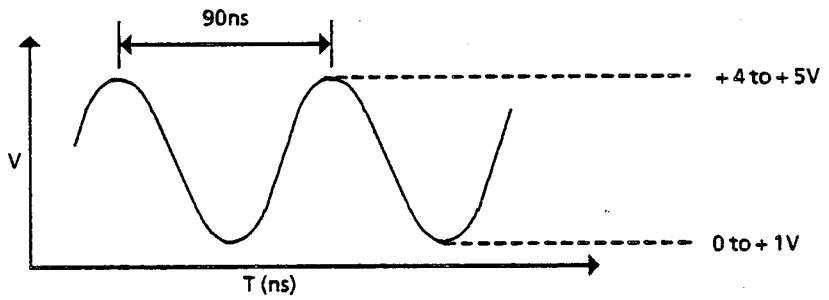


Figure E-3-1

- No Replace OSC.
- Yes Is RST signal of Q3 as shown in Figure E-3-2?

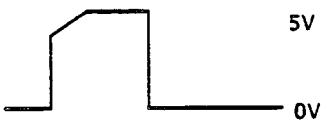


Figure E-3-2

- No Check RST circuit on LXMC board.

Ⓐ

Ⓐ

Yes Are ALE, $\overline{PSED}$, $\overline{RD}$, $\overline{WR}$, and BUS signals of Q3 as shown in Figure E-3-3?

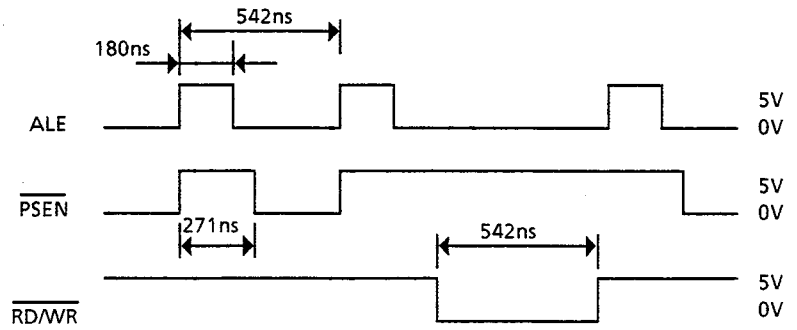


Figure E-3-3

- No Replace Q3.

Yes Are T1 ($\overline{SELECT}$) and ($\overline{BUSY}$) signals low level?

- No Check Q11 on LXMC board .

Yes Are + 9V and – 9V output?

- No Replace components of the ± 9V control circuit.

Yes SSD signal at pin 1 in Q3 high level?

- No Replace Q3.

Yes Is SSD at pin 11 in Q1 low level?

- No Replace Q1 or CN1?

Yes Is RxD in Q3 as shown in Figure E-3-4?

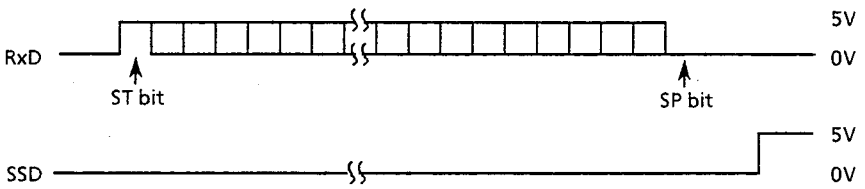


Figure E-3-4

- No Replace Q2.

Yes Replace Q3.

② During serial interface reception, some print data is skipped or the printer does not operate.

- Are RxD and SSD in Q3 as shown in Figure E-3-4?
  - No Replace Q2.

Yes Are $\overline{WR}$ and BUS signals at pin 3 in Q3 as shown in Figure E-3-5?

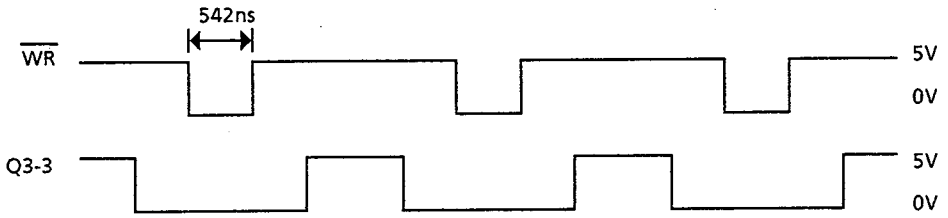


Figure E-3-5

- NO Replace Q3

Yes Are Bus signal and DB0-7 in Q3 at the same level at $\overline{WR}$ signal rise time?

- NO Replace Q7.

Yes The signal at pin 4 in Q6 the same as $\overline{WR}$ signal in Figure E-3-5?

- NO Replace Q6.

Yes Check Q11 on LXMC board.

3.3 Local Test

3.3.1 Circuit test mode

3.3.1.1 Setting

(1) Diagnostic test set by menu. Chonge Diagnostic test to "Yes".

(2) Test connector

Plug the test connector shown in Figure E-3-6 into the serial interface connector.

Equivalent to Canon DB-25P

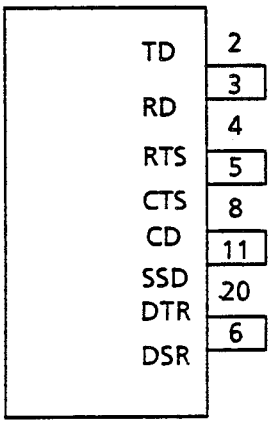


Figure E-3-6 Test connector diagram

3.3.1.2 Function

After the settings outlined in Section 3.3.1.1 are completed and power is turned on, the serial interface checks the message buffer memory and interface driver/receiver circuits. It then prints selected characters.

To start and stop this test, push the SEL switch on the front of the printer.

Details of this test are explained on the next page.

(1) Prints the serial program revision.

(2) Prints "LOOP TEST".

(3) Check memory for message buffer.

(4) Prints "GOOD" if the memory check is OK or "BAD" if the memory check fails.

(5) Output Low to DTR, RTS, and SSD signals. If one of the DSR, CTS, or CD signals is High, it prints "IF BAD". If the DSR, CTS, and CD signals are all Low, it prints "I/F = GOOD".

(6) Output High to DTR, RTS, and SSD signals. If one of the DSR, CTS, or CD signals is Low, prints "IF BAD". If the DSR, CTS, and CD signals are all High, prints "I/F GOOD".

(7) Transmits characters from code 20H to 7FH by SD signals. At the same time, characters are received from the RD signal and stored in the message buffer.

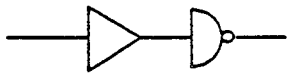
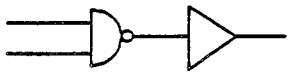
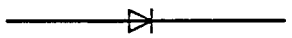
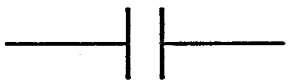
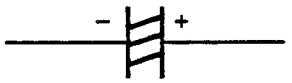
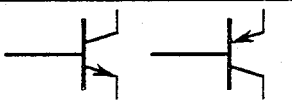
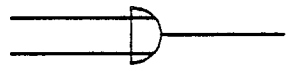
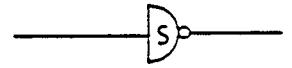
(8) Prints the characters that were stored in the message bufer as indicated in (7).

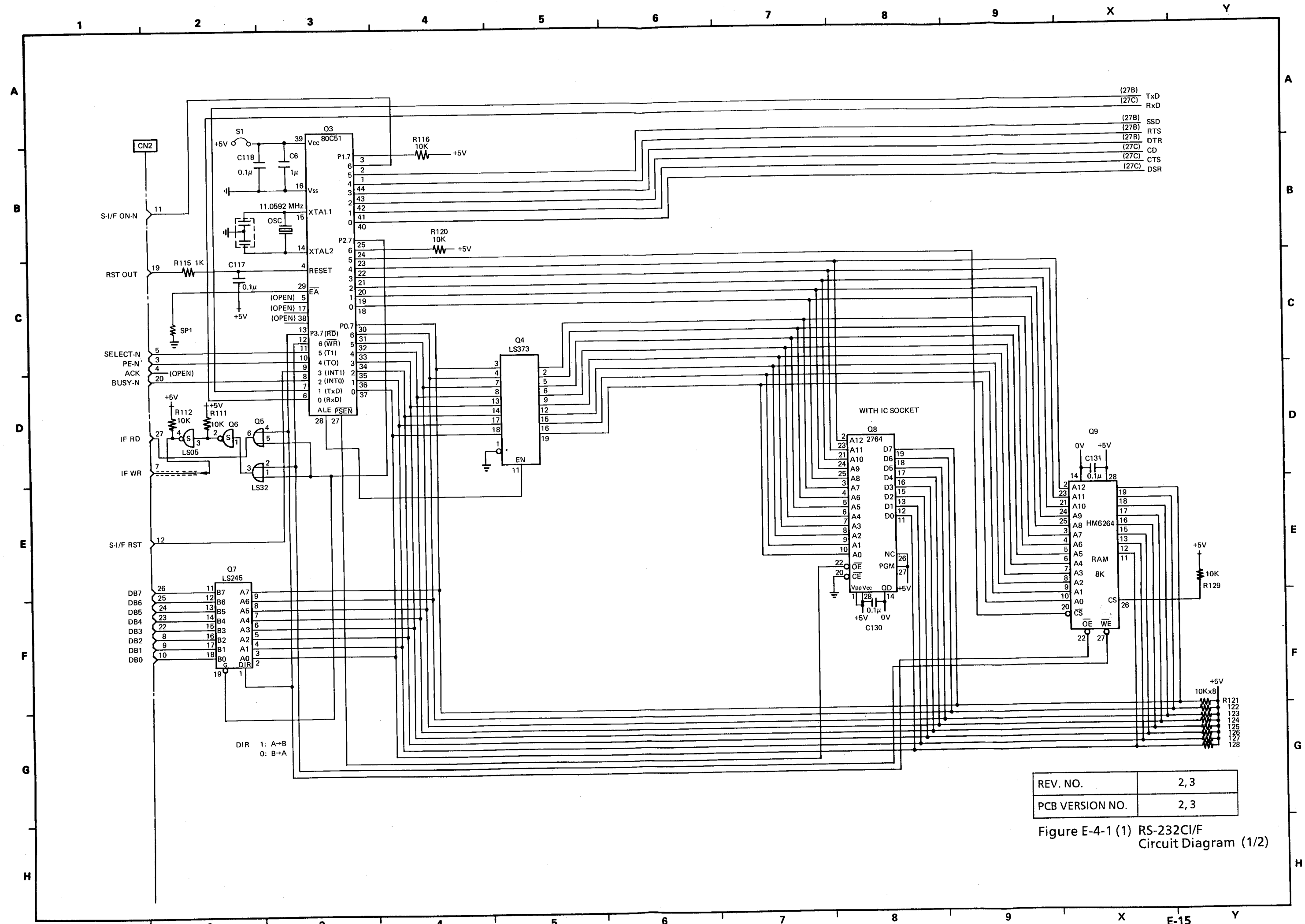
(9) Steps (1) through (8) are repeated until printer is deselected or turned off.

4. CIRCUIT SYMBOLS AND CIRCUIT DIAGRAMS

Table E-4-1. lists the circuit symbols used in the super-speed RS-232C interface circuit diagram. Figures E-4-1 are the circuit diagrams.

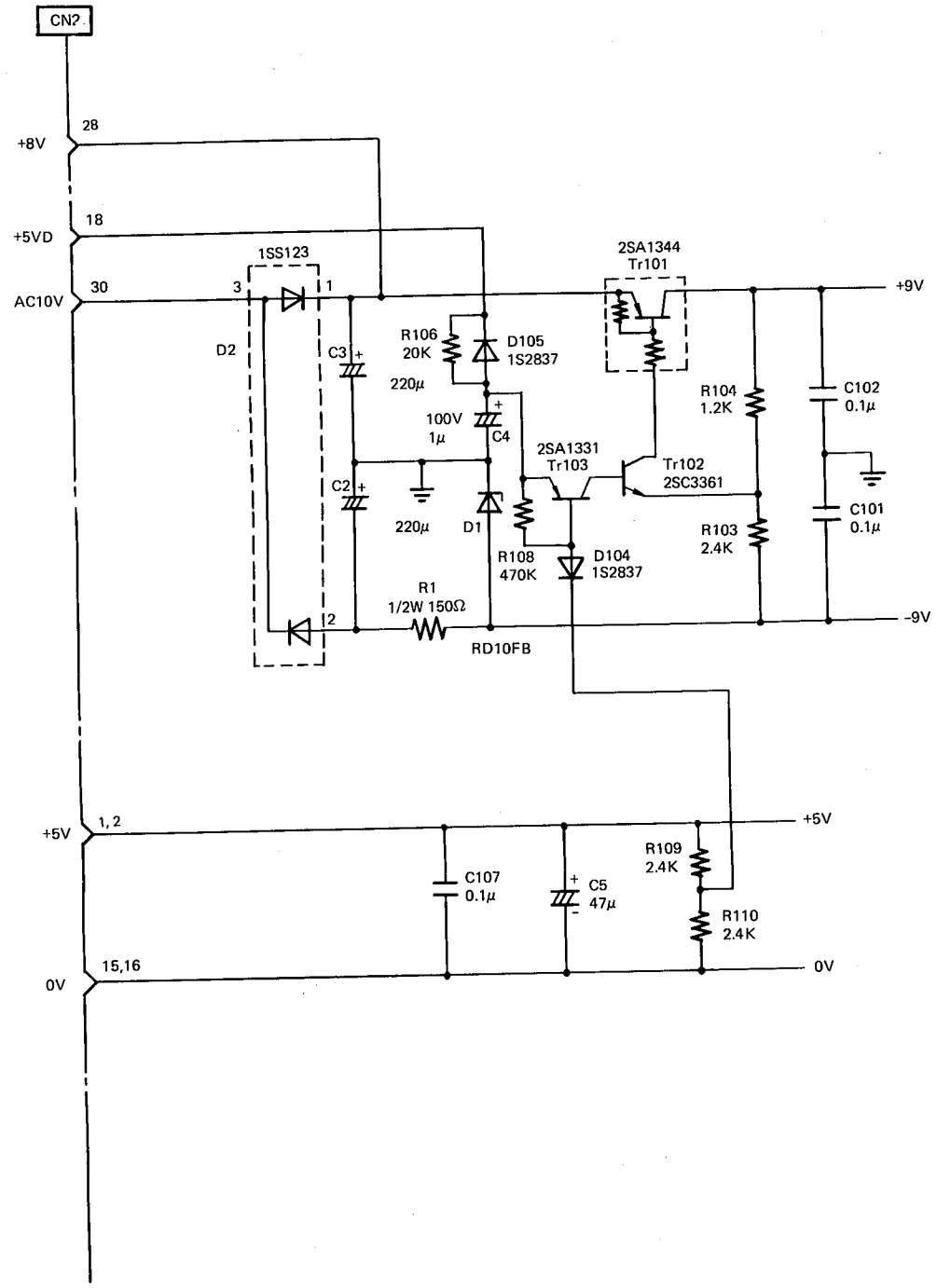
Table E-4-1 Table of symbols

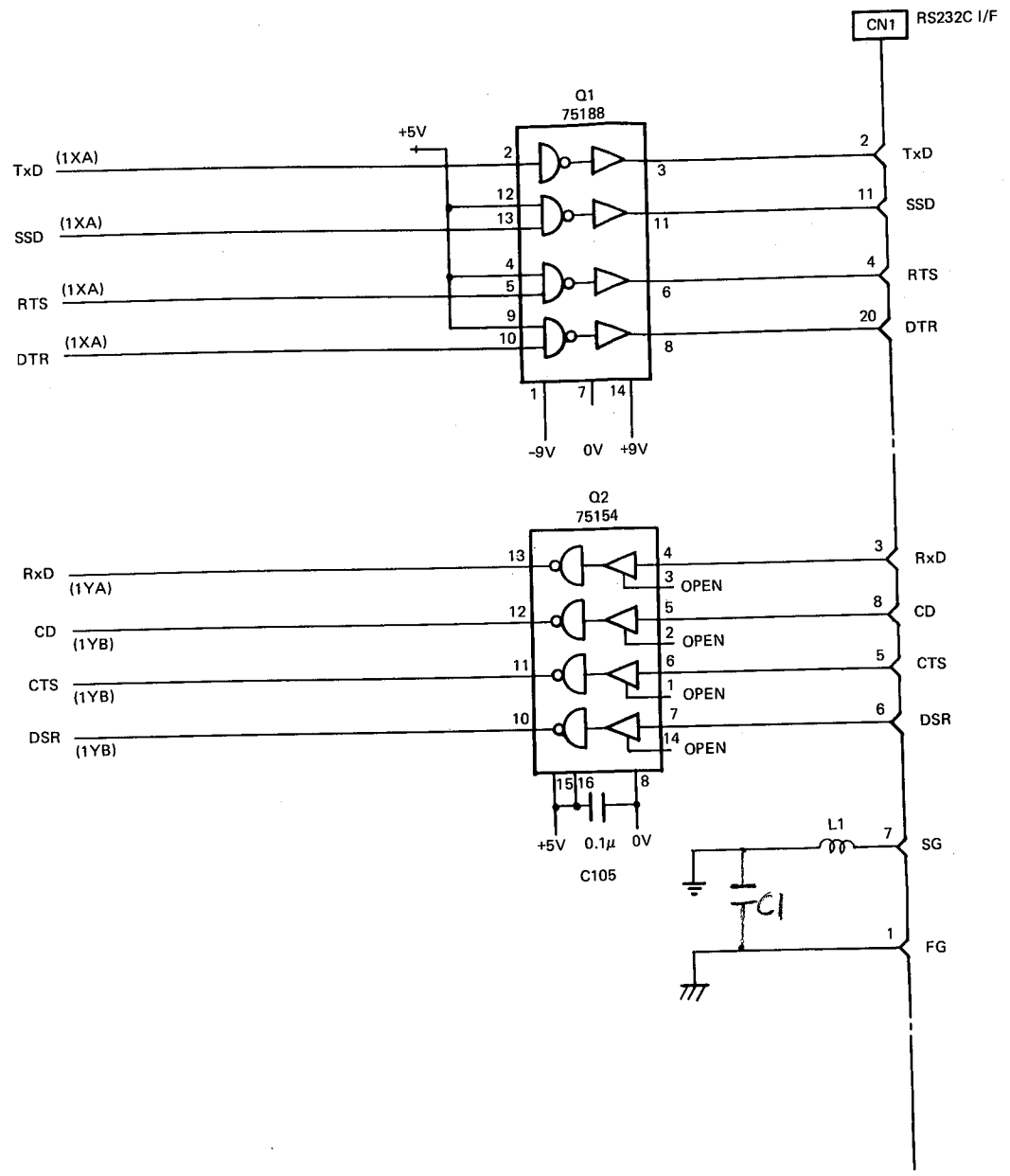
Symbol	Mark	Details
	Q	SN75154 line receiver
	Q	HD75188 line driver
	OSC	Oscillator
	D	Diode
	D	Zener diode
	C	Capacitor
	C	Electrolytic capacitor
	R	Resistor
	Tr	Transistor
	Q	MB74LS32 20R
	S	Jumper wire
	Q	74LS05



REV. NO.	2, 3
PCB VERSION NO.	2, 3

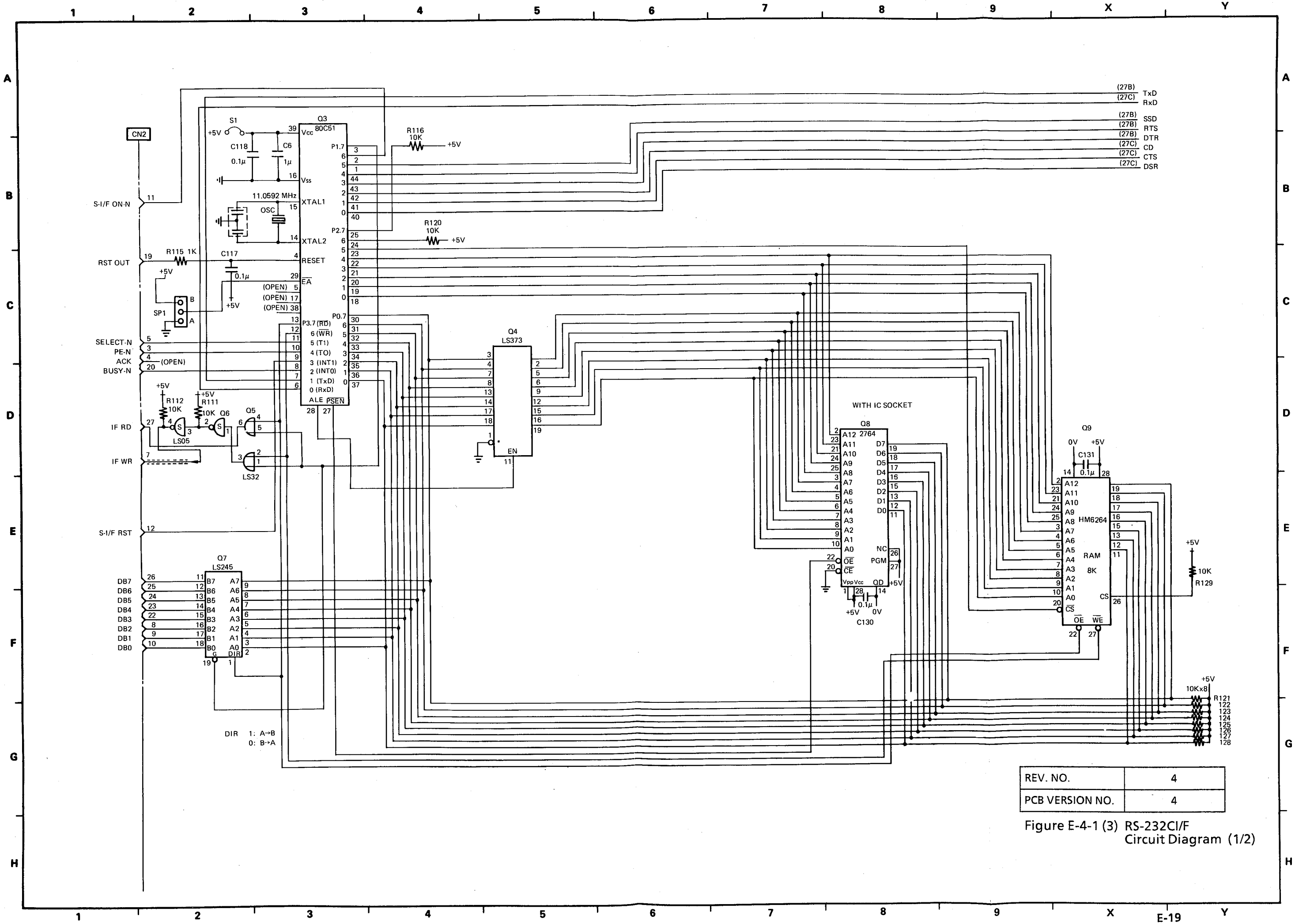
Figure E-4-1 (1) RS-232CI/F Circuit Diagram (1/2)





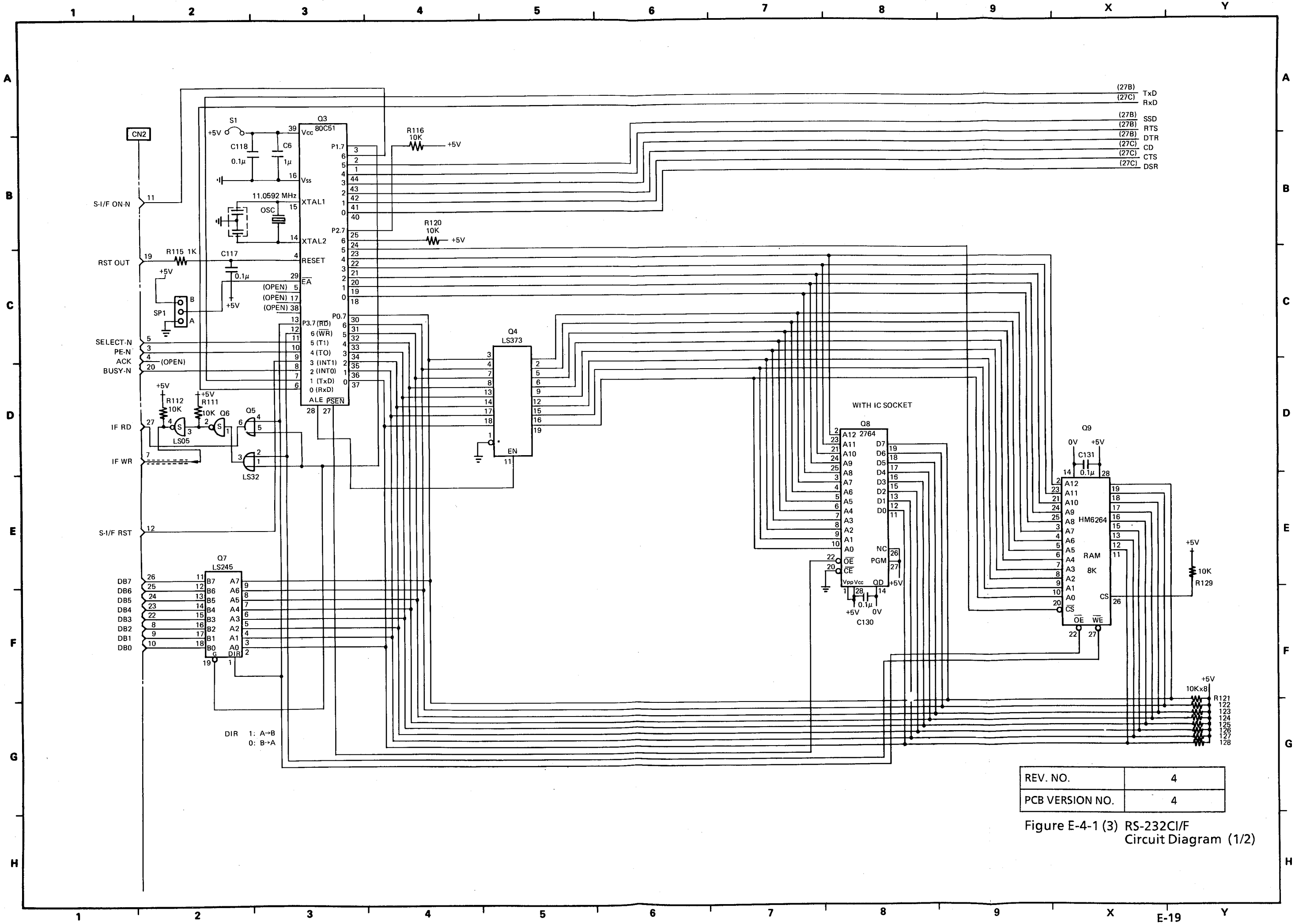
REV. NO.	2, 3
PCB VERSION NO.	2, 3

Figure E-4-1 (2) RS-232CI/F Circuit Diagram (2/2)



REV. NO.	4
PCB VERSION NO.	4

Figure E-4-1 (3) RS-232CI/F Circuit Diagram (1/2)



REV. NO.	4
PCB VERSION NO.	4

Figure E-4-1 (3) RS-232CI/F Circuit Diagram (1/2)

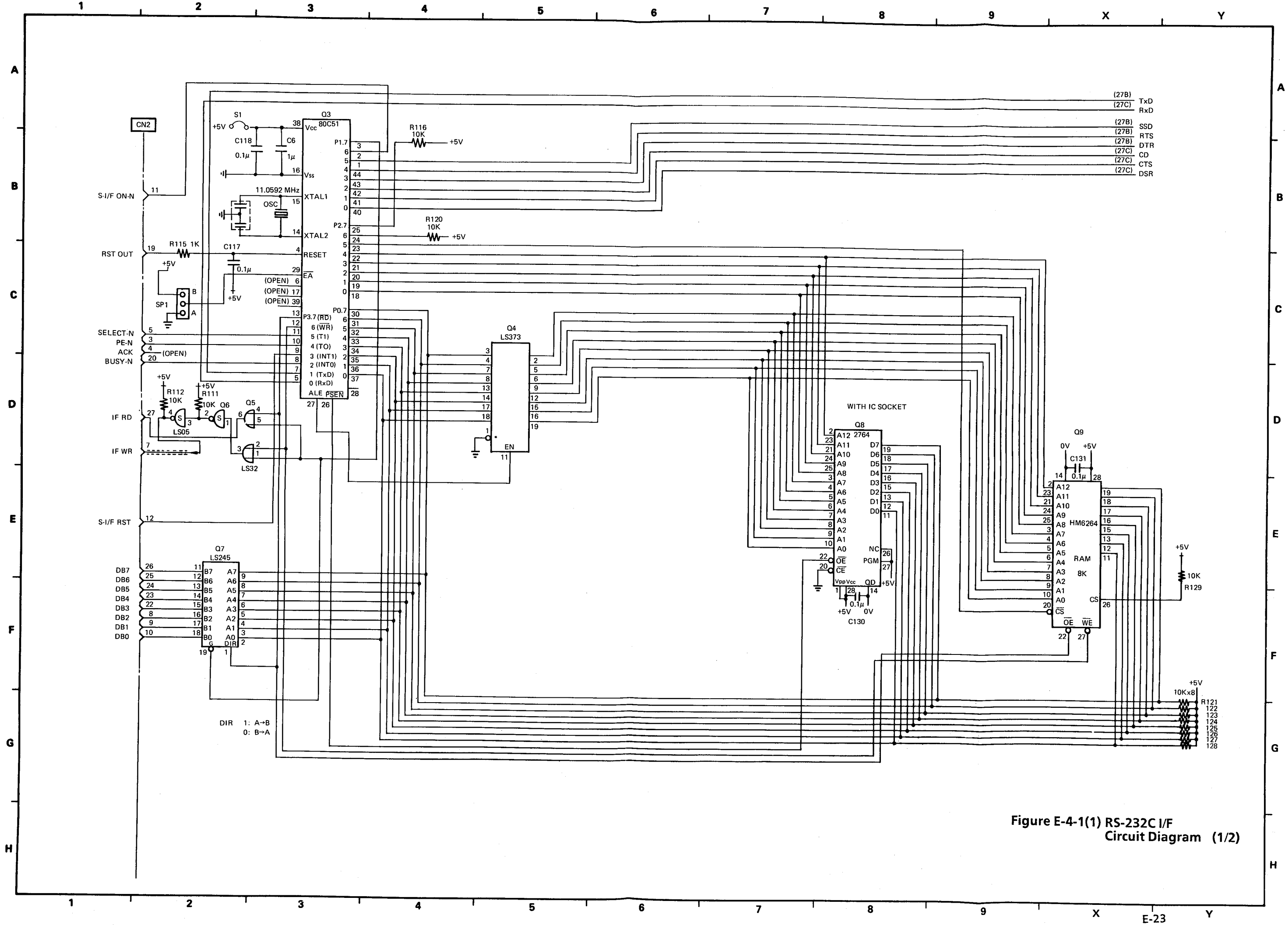


Figure E-4-1(1) RS-232C I/F Circuit Diagram (1/2)

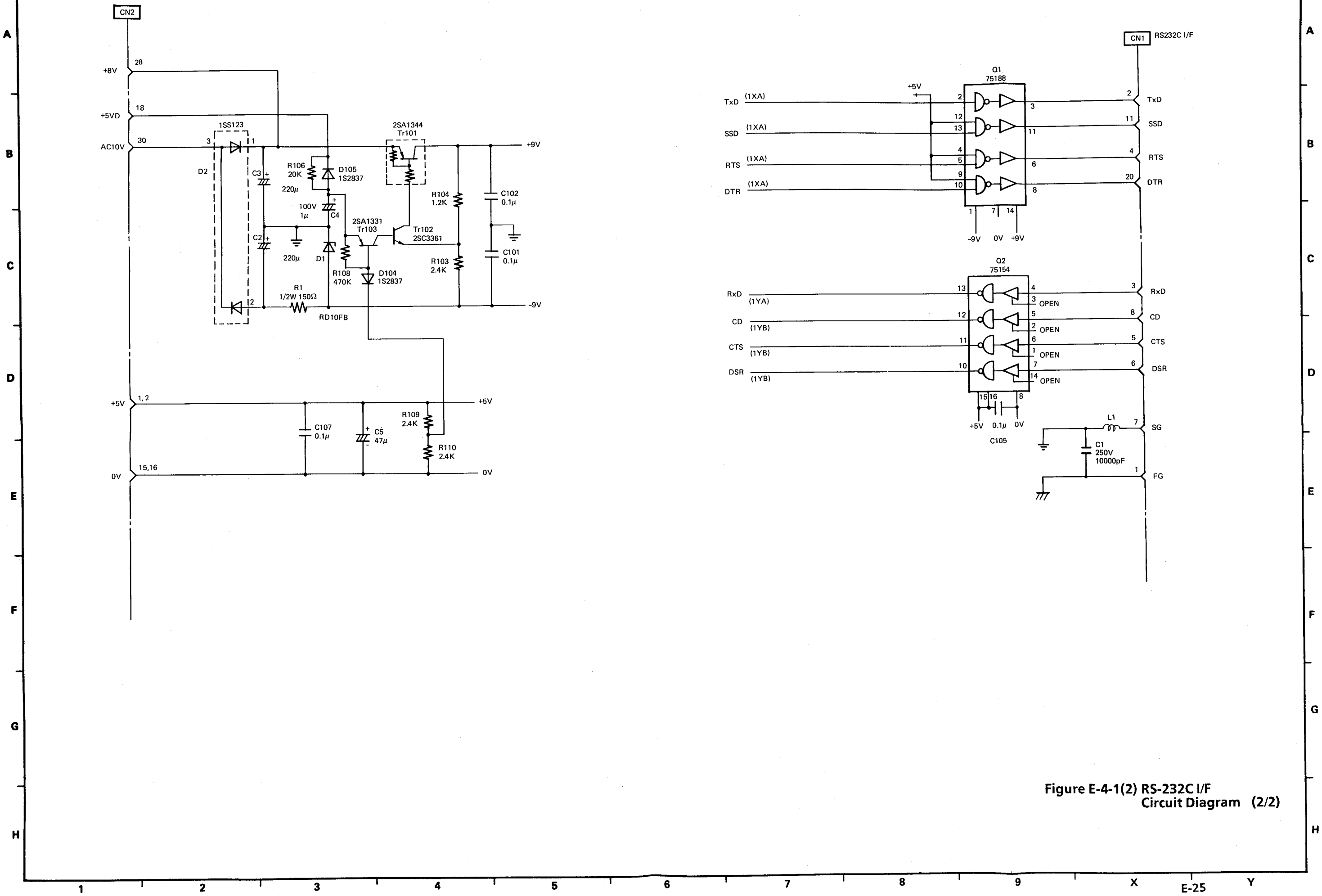
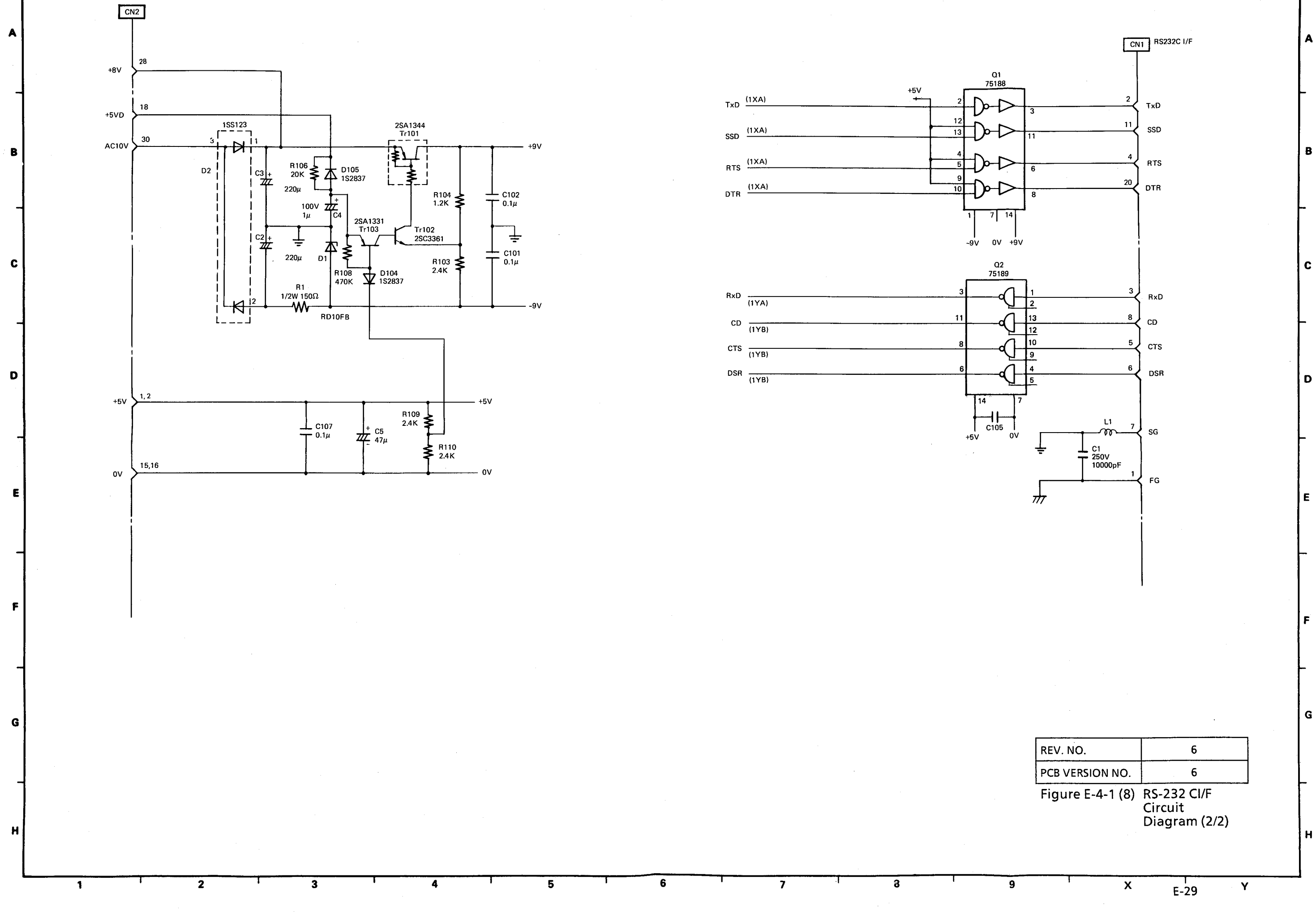


Figure E-4-1(2) RS-232C I/F Circuit Diagram (2/2)

REV. NO.	6
PCB VERSION NO.	6

Figure E-4-1 (7) RS-232 CI/F Circuit Diagram (1/2)



REV. NO.	6
PCB VERSION NO.	6

Figure E-4-1 (8) RS-232 CI/F Circuit Diagram (2/2)

無断転写禁止

図番	3S55005-1494	89.10.20	作成
名称	LXHA- 印刷回路板回路図		承認
			検図
			製図
			設計
1/1			尺度

沖電気工業株式会社

版	変更事項	年月日	設計	検図